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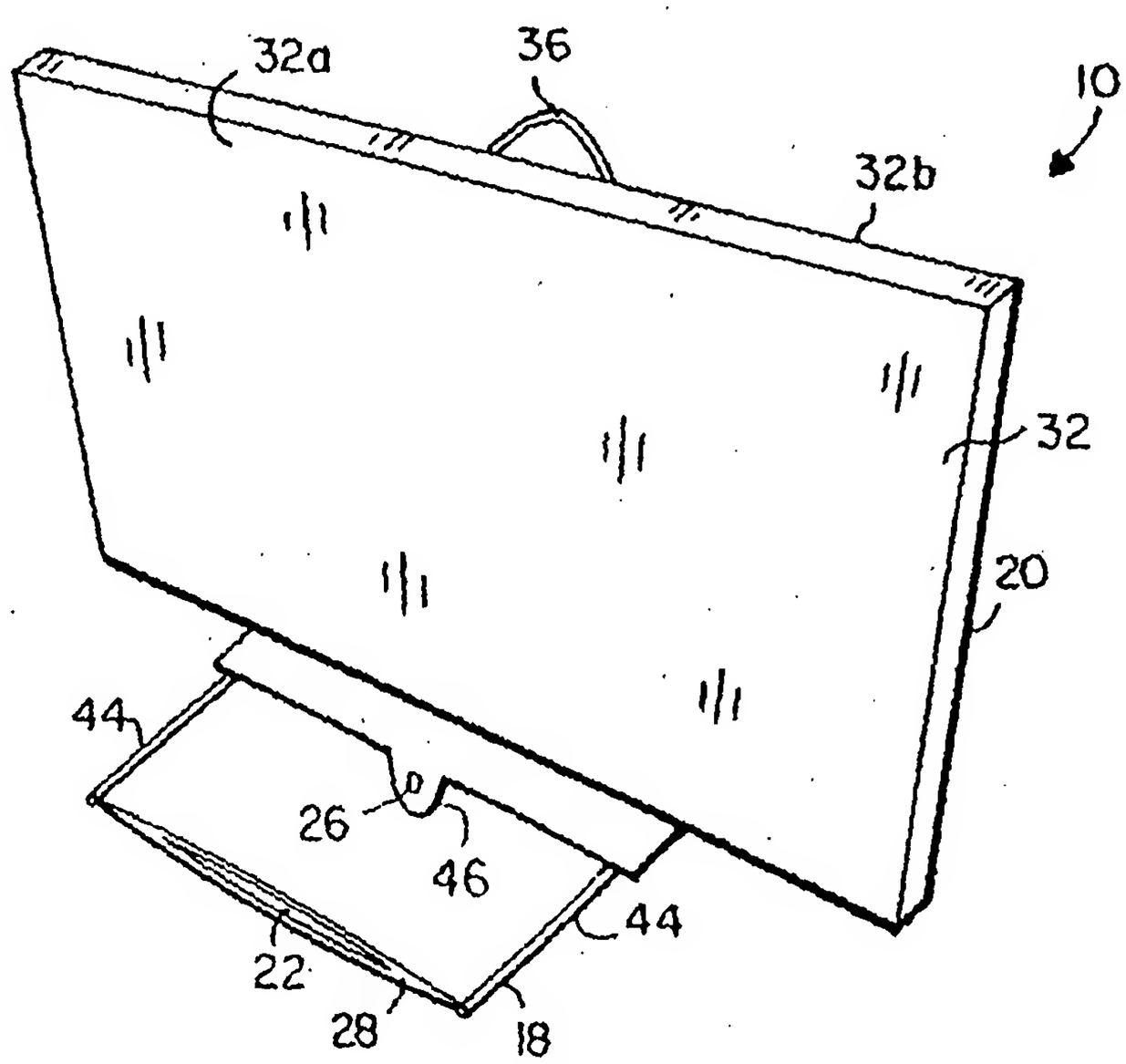
(54) Title: SINGLE AND MULTIPLE IMAGE DISPLAY APPARATUS FOR WORKS OF ART AND PHOTOGRAPHS



(57) Abstract: A display apparatus (10) for an art work (12) includes a work support structure (20) on which the art work (12) rests; a power source (16); and an electric power circuit (18) containing a low heat, full spectrum light source (22), oriented toward the work (12) and a switch (24) wired to a sensor (26) which is preferably a conventional motion sensor oriented to detect the approach of a person, and upon detection of motion or heat to close the switch (24) and thereby activate the light source (22) to illuminate a work (12) resting on the support structure (20). Sensor (26) may be a passive infrared sensor for detecting the presence of a person or an animal within close proximity to the device. A lenticular image sheet (212) printed with a series of discrete elongate image segments (214) of the several two-dimensional images, and a translucent back panel (220) behind image sheet (212) and a light source (230) laterally adjacent to or behind back panel (220) oriented to cast light through image sheet (212).

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SINGLE AND MULTIPLE IMAGE DISPLAY APPARATUS FOR WORKS OF ART AND PHOTOGRAPHS

BACKGROUND OF THE INVENTION

1. Field of the Invention:

The present invention relates generally to the field of display means for works of pure and commercial art. More specifically the present invention relates to a display apparatus for art works including a work support structure and an electric power circuit containing a low heat, full spectrum light source, oriented toward the work and a switch wired to a motion sensor oriented to detect the approach of a person, and upon detection to close the switch and thereby activate the light source to illuminate a work resting on the support structure.

For paintings, the work support structure includes a backboard having a forward face against which the painting is placed and a rearward face against which several flat lead batteries are removably mounted with conventional fasteners. For photographs, the work support structure includes housing, the upper portion of which is a generally rectangular translucent panel bent at its middle region into an inverted V-shape to present two opposing photograph mounting surfaces. The translucent panel fits onto a housing lower portion having generally triangular end walls sized and shaped to fit snugly across the interior of the translucent panel V-shape, and having front and rear walls shorter than the side walls so that the translucent panel

completes and closes the front and rear of the housing, and having a removable bottom wall. The photographic images are inventively provided with high pigment intensity and selected brightened areas, for illuminated display. A painting print and photograph displaying embodiment is provided which displays a print or photographic image on only one, forward face. For this embodiment, the work support structure includes picture frame having a generally dish-shaped backpanel having at its center the light source as described above oriented to cast light forwardly through the photograph. For glass sculpture and specifically for crystal sculpture and for such as the commercial art found in high quality perfume bottles, the work support structure includes a cylindrical hollow pedestal containing the power circuit, with the light source oriented to cast light upwardly and with the motion sensor mounted in an opening in the front of the pedestal. The pedestal has a horizontal top wall with an upper wall on which the art work is placed, and the upper wall includes a diametrically elongate light passing opening.

The present invention also relates to a variation of the apparatus for alternatingly displaying several distinct and separate two-dimensional images, such as for advertising purposes. This apparatus preferably includes a lenticular image sheet printed with a series of discrete elongate segments of the several two-dimensional images, and a translucent back panel behind the image sheet and a light source behind the back panel oriented to cast light through the image sheet. The image segments are mutually parallel and laterally spaced apart in a repeating sequence comprising a segment of a first image, and then a segment of a second image and then a segment of a third image. The apparatus further includes a lenticular lens in the form of a flat sheet of transparent material having a lens surface embossed with an array of mutually parallel linear lens bulges corresponding in width and lateral spacing with image segment widths and lateral spacing; and a frame housing retaining the image sheet and the lens in front of

and substantially parallel with the image sheet. For each of several viewing perspectives, the image segments for each given image exclusively combine or interface with each other through the lenticular lens to present each given image to the observer. Thus movement of an observer standing generally in front of the lens relative to the apparatus causes all and only image segments of the first image to become visible through the lens so that the first image appears substantially complete, and then causes all and only image segments of the second image to become visible through the lens so that the second image appears substantially complete, and then causes all and only image segments of the third image to become visible through the lens so that the third image appears substantially complete. The three images are merely exemplary, and presentation of more than three images or of just two images is contemplated. The lens is preferably mounted within the frame housing to be laterally movable relative to the image sheet and is laterally moved by an image sheet reciprocating mechanism against the biasing of an opposing spring so that the images appear in sequence to a stationary observer. The lens is moved horizontally so that the shifting position of the observer as he or she walks by the apparatus does not cancel or alter the shift of the image from his or her perspective.

2. Description of the Prior Art:

There have long been easels and wall mounted frames adjacent to incandescent light sources receiving power from electric cords plugging into wall sockets, for displaying and illuminating art works. Examples of prior art work lighting products are PICTURE LIGHTS™ and PICTURE-LITE™ of New World Lighting, Inc. A problem with these display means has been that the cords supplying power to the light sources are unsightly and detract from the atmosphere created at an art exhibition. Yet since power is needed to light the art works continuously throughout the day, the use of battery power sources is impractical because they would so frequently require replacing. Another problem is

that the continuous illumination, in a sense, causes the art works to become part of the background and draw less notice.

Photographs having artistic content can be difficult to see well if displayed in a conventional frame, and present the same unsightly power cord problems identified above for paintings. By the same token, the subtleties in color and shape of glass sculpture and ornate glass product containers can be lost when they are simply placed on display pedestals, even when light is directed at them.

It is thus an object of the present invention to provide an apparatus for mounting and displaying works of art, including an electric power circuit and light source oriented to cast light onto or through the art work, the light source being fluorescent and of very small diameter to illuminate quickly and converting a larger than average percentage of power supplied to it to light rather than heat, and thus emitting minimal heat while casting very bright light.

It is another object of the present invention to provide such an apparatus which includes a motion or heat sensor and switch combination in the power circuit to detect the approach of a potential viewer and thereupon close the switch to deliver power to the light source and illuminate the art work as the person approaches.

It is a still further object of the present invention to provide such an apparatus which prevents the typical loss of interest in a glass sculpture occurring when the purchaser takes the work from a shop in which it was well illuminated to his or her home in which there is only minimal illumination.

It is still another object of the present invention to provide such an apparatus which includes a timer within the motion sensor and switch combination to open the switch after a pre-set length of time following the last detected movement, so that electric power is conserved to make batteries a practical power source and so that the attention of a potential viewer is drawn to the art work as

he or she approaches the apparatus and work. This object in practical terms requires use of the rapid illumination light source mentioned in one of the previous objects, because a conventionally wide fluorescent bulb might not light at all before the timer duration elapsed and turned off power to the bulb.

It is yet another object of the present invention to provide such an apparatus which can illuminate photographs and prints of paintings with full pigment intensity, avoiding a color washout, and which can also radiate greater light intensity at selected locations on the photographs, such as where one would expect bright areas in the photograph images.

It is another object of the present invention to provide such an apparatus which is relatively inexpensive to manufacture and is attractive in appearance.

It is another object of the present invention to provide an apparatus for mounting and displaying with rear illumination multiple two-dimensional images in a single frame, in which the images shift from one to the next so that only one image is displayed at a time to an observer, thereby attracting and holding the attention of the observer.

It is another object of the present invention to provide such an apparatus which includes a motion or heat sensor and switch combination in the power circuit to detect the approach of a potential viewer and thereupon close the switch to deliver power to the light source and illuminate the images as the person approaches.

It is another object of the present invention to provide such an apparatus which includes a timer within the motion sensor and switch combination to open the switch after a pre-set length of time following the last detected movement, so that electric power is conserved to make batteries a practical power source and so that the attention of a potential viewer is drawn to the image as he or she approaches the apparatus and image. This object in practical terms requires use of the rapid illumination

light source mentioned in one of the previous objects, because a conventionally wide fluorescent bulb might not light at all before the timer duration elapsed and turned off power to the bulb.

It is a further object of the invention to provide an apparatus for displaying two-dimensional images having the general appearance of a frame and having an add-on outer border and an add-on inner border to provide the option of altering the appearance of the display.

It is a still further object of the present invention to provide such an apparatus which can illuminate photographs and prints of paintings with full pigment intensity, avoiding a color washout, and which can also radiate greater light intensity at selected locations on the photographs, such as where one would expect bright areas in the photograph images.

It is finally an object of the present invention to provide such an apparatus which is relatively inexpensive to manufacture and is attractive in appearance.

SUMMARY OF THE INVENTION

The present invention accomplishes the above-stated objectives, as well as others, as may be determined by a fair reading and interpretation of the entire specification.

A display apparatus is provided for an art work, including a work support structure on which the art work rests; a power source; and an electric power circuit containing a light source oriented toward the work and a switch wired to a motion sensor for detecting the approach of a person, and upon detection to close the switch and thereby activate the light source to illuminate the work.

The light source preferably is a low heat, substantially full visible spectrum light source. The light source preferably includes a fluorescent bulb and a reflector adjacent to the fluorescent bulb, the reflector being oriented relative to the fluorescent bulb to direct light from the fluorescent bulb toward the art work. The apparatus preferably additionally includes a timer, where

the motion sensor is connected to the timer to shut off the switch a pre-set length of time after the moment of the last detected motion.

Where the art work is a painting, the work support structure preferably includes a backboard having a forward face against which the painting is placed and having a rearward face; and the power source includes a battery adjacent to the rearward face; and the circuit includes wiring extending from the battery to a pair of spaced apart conductive lead rods protruding forwardly beneath and perpendicular to the backboard, the having lead rod forward ends being interconnected by the light source, the light source being oriented to cast light toward the backboard forward face. The backboard has a lower end and the apparatus preferably additionally includes a protrusion at the backboard lower end having a protrusion port containing the motion sensor, the protrusion being notched to engage and support the painting lower edge.

Where the art work is at least one photograph, the work support structure preferably includes a housing having a housing upper portion including a substantially rectangular translucent panel bent at its middle region into an inverted V-shape to present two opposing photograph mounting surfaces; a housing lower portion onto which the translucent panel fits, the housing lower portion having substantially triangular end walls sized and shaped to fit across the interior of the folded the translucent panel, and having front and rear walls shorter than the end walls so that the translucent panel completes and substantially closes the housing, and having a removable bottom wall; where the light source is oriented to cast light upwardly into the folded the translucent panel and out through the translucent panel and through any photograph mounted against the translucent panel. The translucent panel preferably is formed of a clear acrylic. The power source preferably is a battery pack resting on top of the bottom wall, and the power circuit preferably includes wires extending from the battery pack to the light source and to

the motion sensor, the timer and the switch. The motion sensor preferably is fit into a port within the housing front wall, surrounded by a photograph supporting protrusion.

The composite image photograph preferably includes a sheet having sheet forward and rearward faces and having corresponding mirror images printed on both of the forward and rearward faces for enhanced pigment intensity when illuminated. The photographic images include areas of reduced or increased pigmentation to permit more or less light, respectively, from the light source to pass through these areas. Alternatively, the composite image photograph may be a conventional photograph with an image on its forward face and a transparent film sheet placed behind the photograph having a reversed image aligned with the photograph image to produce the composite image when light is shined through the photograph and film.

Where art work is a photograph or a print of a painting the work support structure preferably includes a picture frame containing a frosted acrylic mounting panel for containing the art work and a substantially dish-shaped backpanel removably secured to the backboard, the backboard having the light source secured its center and oriented to cast light forwardly through the picture frame and through the work. The apparatus preferably additionally includes a backpanel propping stand secured to the backpanel for propping the backpanel upright on a table. The backpanel preferably has a battery recess and the power circuit preferably includes circuit wiring extending from the light source through the backpanel into the battery recess, and the power source is at least one battery secured within the battery recess.

Where the art work is a glass sculpture, the work support structure preferably includes a hollow pedestal containing the power circuit and the light source, the pedestal having a pedestal side wall and a pedestal top wall with a light passing opening, the light source being oriented to cast light upwardly through the light passing

opening; the motion sensor being fitted through a motion sensor opening in the pedestal; so that activation of the light source by the motion sensor causes light to pass through the light passing opening into the art work resting on the top wall, and the light is defracted and scattered throughout the interior of the art work, illuminating and highlighting any corners, irregularities in configuration and tinting in the art work. The light passing opening is preferably elongate. The pedestal preferably includes a pedestal bottom wall which is removably fitted to the pedestal side wall for access to the light source and the power source. The power source preferably includes a wall outlet, a power cord extending from the wall outlet and a transformer between the wall outlet and power cord. The motion sensor, the switch, and the timer are optionally combined as a single unit.

A method of illiminating an art work is provided using the above described apparatus, including the steps of detecting the approach of a person with the sensor; activating the light source by operating the switch upon detecting the approach of a person to shine on the art work; and deactivating the light source by operating the switch with said timer after a certain length of time has passed following detection of a person approaching.

An additional embodiment of an apparatus is further provided for sequentially displaying several distinct and separate two-dimensional images, including a lenticular image sheet printed with a series of discrete elongate image segments of at least two images, the image segments being mutually parallel and laterally spaced apart in a repeating sequence including a segment of a first image, and then a segment of a second image; a translucent back panel behind the image sheet; a light source oriented to cast light through the back panel; a power source connected to the light source through a power circuit; a lenticular lens including a sheet of transparent material having a lens surface embossed with an array of mutually parallel linear lens bulges corresponding in width and lateral

spacing with the width and lateral spacing of the image segments; and a frame housing retaining the image sheet and the lens in front of and substantially parallel with the image sheet, the frame housing having an open forward region through which the image sheet is visible through the lens; so that the image segments for each given image exclusively combine with each other through the lenticular lens to present exclusively each given image to an observer in front of the frame housing.

The additional embodiment of the apparatus preferably additionally includes a mechanism for causing relative movement between the lens and the image sheet. The apparatus preferably additionally includes a lens retaining structure slidably retaining the lens within the frame housing. The apparatus preferably still additionally includes an lens reciprocating mechanism mounted to slide the lens within the lens retaining structure so that the images appear in sequence to a stationary observer. The apparatus preferably further includes a reciprocation biasing spring mounted against the lens opposite the lens reciprocating mechanism for returning the lens after the lens is moved by the reciprocating mechanism. The lens preferably is moved horizontally by the lens reciprocating mechanism so that shifting positions of a moving observer do not cancel the change of image visible to the observer.

The lens retaining structure preferably includes several guide screws extending rearwardly through ports in the forward panel and in the back panel, the guide screws being positioned relative to the back panel so that two first guide screws substantially define a line along which an edge of the lens is placed and a second guide screw is spaced from the line a distance corresponding to the width of the lens, so that the lens fits slidably between the first guide screws and the second the guide screw. The back panel preferably is substantially rectangular, and the guide screws are located at each corner of the lens and the lens is substantially rectangular, so that two opposing and parallel rectilinear lens edges ride along the first and

second guide screws, respectively, as the lens slides within the lens retaining structure. The apparatus preferably additionally includes a forward panel fitted over the forward face of the lens, having forward panel ports fitting over the first and second guide screws, and the guide screws are threaded at their rearward ends and fit engagingly into threaded ports in the back panel, to hold the back panel, the lens and the forward panel together. The apparatus preferably additionally includes a spring between the back panel and the forward panel to create a desired minimal amount of force against the forward panel to keep the forward panel in contact with the lens.

The frame housing preferably is a substantially dish-shaped frame panel oriented substantially vertically, the frame panel having a substantially rectangular perimeter panel border to present the visual impression of a frame, a picture abutment region of the frame panel immediately within the panel border and extending toward the center of the frame panel and recessed rearwardly, and a central depression defining a battery compartment encompassed by the abutment region, where the backboard, image sheet, and lens are fitted and removably secured within the panel border abutting the abutment region.

The additional embodiment of the apparatus preferably additionally includes an outer conversion border for fitting over and around the panel border, the outer conversion border including a rectangular or otherwise shaped elongate member configured as a loop having the general shape of the frame panel perimeter, the outer conversion border having a forward molding, an integral receiving perimeter flange extending rearwardly from and along the forward molding, and being spaced radially outwardly from the forward molding inner edge to create a frame housing receiving step along the forward molding; so that the frame panel fits closely within the receiving step and is contained by the perimeter flange; and tabs for obstructing the frame panel from sliding out of the

perimeter flange. The apparatus preferably still additionally includes an inner conversion border including a looped elongate member shaped and sized in perimeter to fit snugly within the frame panel, over the lens and over the image sheet.

The additional embodiment preferably further includes terminal wiring, a PC board and a battery charger and a battery charger outlet, where the electric power source includes a battery connected to the terminal wiring and to the PC board, the PC board being contained within the battery compartment, and the wiring being connected to the battery charger outlet and the battery charger outlet being mounted in a port in the frame panel to face outwardly from the frame panel; and a battery charger having structure for plugging into the battery charger outlet and for plugging into a building wall outlet.

The light source preferably includes a bulb notch in an edge of the back panel, a fluorescent light bulb fitted within the bulb notch, so that the fluorescent light bulb casts light into and through the back panel and forwardly through the image sheet. The apparatus preferably additionally includes a motion sensor mounted to the frame housing and directed to sense motion generally forwardly of the apparatus, the motion sensor being integrated into the power circuit so that the light source is activated only when movement is sensed. The apparatus preferably additionally includes a timer circuit element incorporated into the power circuit for shutting off power to the light source after a certain amount of time has passed since the motion sensor last detected motion. The apparatus preferably further includes a table top stand including a block having a mounting notch in its upper surface for removably receiving an edge of the frame panel to hold the frame panel upright.

BRIEF DESCRIPTION OF THE DRAWINGS

Various other objects, advantages, and features of the invention will become apparent to those skilled in the art from the following discussion taken in conjunction with the

following drawings, in which:

FIGURE 1 is a perspective view of the first preferred embodiment of the art display apparatus, specifically for paintings.

FIGURE 2 is another perspective view of the apparatus of FIGURE 1.

FIGURE 3 is a perspective view of the apparatus of FIGURE 1 with a painting mounted on the apparatus.

FIGURE 4 is a perspective view of the apparatus of the second embodiment, specifically for photographs, assembled and having a photograph mounted on one of its display faces.

FIGURE 5 is perspective view of the apparatus of FIGURE 4 with the photograph removed and the housing upper portion separated from the housing lower portion.

FIGURE 6 is an exploded view of the apparatus of FIGURE 4, showing the light source, motion sensor and battery pack, and removably bottom wall.

FIGURE 7 is a front view of the inventive photograph, showing one of the two images. FIGURE 8 is a rear view of the inventive photograph, showing the second image forming the composite image, the second image having the selected areas of pigment removed to brighten those areas in the composite image as light shines through the composite image.

FIGURE 9 is a perspective view of the third embodiment of the apparatus, once again specifically for photographs, assembled and having a photograph mounted in its frame portion for display.

FIGURE 10 is a perspective front view of the frame backpanel for the apparatus of FIGURE 9, showing the dish shape and light source. FIGURE 11 is a perspective view of the backpanel of FIGURE 10 showing the battery recesses, each recess shown containing three "C" batteries.

FIGURE 12 is an exploded view of the fourth preferred embodiment of the apparatus, specifically for glass sculpture such as high end perfume bottles, showing the light source, battery pack and motion sensor, and removable

bottom wall.

FIGURE 13 is a perspective view of the apparatus of FIGURE 12 assembled. The housing happens to be square in this illustration, but it can also be round as shown in FIGURES 14-15.

FIGURE 14 is a view of the apparatus of FIGURE 12 with a glass sculpture poised above the apparatus for placement on the apparatus top wall for display.

FIGURE 15 is a view as in FIGURE 14 with the glass sculpture shown lowered onto the apparatus top wall, ready for lighting and display.

FIGURE 16 is a perspective view of the fifth preferred embodiment of the apparatus, specifically for opaque sculpture, showing the light source and removable bottom wall.

FIGURE 17 is a block diagram of the functional elements of the apparatus generally for all embodiments.

FIGURE 18 is an exploded perspective view of the preferred embodiment, showing the various elements making up the apparatus image structure, with the frame housing omitted.

FIGURE 19 is a broken away end view of the back panel showing the preferred light bulb receiving notch and bulb positioned for insertion into the notch.

FIGURE 20 is an upper perspective view of the assembled image structure of FIGURE 18.

FIGURE 21 is an upper perspective view of the frame housing, showing the battery compartment and a battery, and the PC board and battery charger.

FIGURE 22 is a cross-sectional side view of the frame panel, the light source and an optional mat cover M positioned to fit over the image structure within the frame panel border.

FIGURE 23 is a side view of a generally C-shaped clip which preferably fits over the notched edge of the back plate to help hold the bulb within the notch.

FIGURE 24 is a perspective view of the table top stand.

FIGURE 25 is a front view of the alternative version of the frame panel.

FIGURE 26 is an end view of the frame panel of FIGURE 25.

FIGURE 27 is a rear perspective view of the outer conversion border, showing the bendable tabs.

FIGURE 28 is a forward perspective view of the conversion border positioned to fit around the frame housing.

FIGURE 29 is a view as in FIGURE 28, of the inner conversion border positioned to fit within the frame housing.

FIGURE 30 is a forward perspective view of the completely assembled apparatus, having the inner conversion border but excluding the outer conversion border.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

As required, detailed embodiments of the present invention are disclosed herein; however, it is to be understood that the disclosed embodiments are merely exemplary of the invention which may be embodied in various forms. Therefore, specific structural and functional details disclosed herein are not to be interpreted as limiting, but merely as a basis for the claims and as a representative basis for teaching one skilled in the art to variously employ the present invention in virtually any appropriately detailed structure.

Reference is now made to the drawings, wherein like characteristics and features of the present invention shown in the various FIGURES are designated by the same reference numerals.

First Preferred Embodiment

Referring to FIGURES 1-17, a display apparatus 10 is disclosed for art works 12 including a work support structure 20, a power source 16 and an electric power circuit 18 containing a low heat, full spectrum light source 22, oriented toward the work 12 and a switch 24 wired to a sensor 26 which is preferably a conventional motion sensor oriented to detect the approach of a person,

and upon detection of motion or heat to close the switch 24 and thereby activate the light source 22 to illuminate a work 12 resting on the support structure 20. Sensor 26 may be a passive infrared sensor for detecting the presence of a person or an animal within close proximity to the device. The device detects body heat on two identical sensor plates within the device and monitors the difference between the heat reaching the two plates. The term "sensor" is used below to indicate either a motion or heat sensor. Sensor 26 and contains a timer 14 set to keep switch 24 closed for a duration of several seconds, preferably 15 to 20 seconds, from the last detected movement. Sensor 26 and switch 24 are preferably contained within a single computer chip. Several embodiments of the work support structure 20 are provided, corresponding to the type of work 12 to be displayed. A block diagram is provided in FIGURE 17 to show the elements of these embodiments generally, and these elements are explained more fully at the end of this detailed description. The preferred light source 22, common to all embodiments, is either part number P/N WL-CFL14115 or P/N WL-CFL14070, by WAMCO, INC™, narrow diameter fluorescent bulbs which are mounted over a reflector plate covered by a strip of reflective tape, preferably of the kind made by 3-M™. Several bulbs may be used to illuminate larger works 12, and the bulbs are preferably low energy bulbs. The power source 16 may be a battery pack or individual batteries, or may be a power cord plugged into a conventional wall outlet and a transformer between the wall outlet and the power cord. For this version the timer duration is preferably set for 60 seconds to one hour. Where power source 16 is a battery, the preferred timer duration is several seconds to conserve power and extend the life of the battery. Where power source 16 is a power cord the preferred timer duration is one hour, although many other time durations are contemplated.

For paintings, the work support structure 20 includes a backboard 32 having a forward face 32a against which the

painting 12 is placed and a rearward face 32b against which several flat lead batteries 34 are removably mounted with conventional fasteners (not shown). See FIGURES 1-3. Backboard 32 is either hung on a wall hanger 36 or supplied with a propping flange and stood up on a table. Power circuit 18 includes wiring extending from the batteries 16 and a pair of spaced apart conductive lead rods 44 connected to the battery wiring and protruding forwardly beneath and perpendicular to backboard 32. The lead rod 44 forward ends are interconnected by the fluorescent light source 22 and reflector 28 which is oriented to cast light toward the backboard forward face 32a and mounted painting 12. The lead rods 44 are preferably telescoping rods so that the distance of light source 22 from the art work 12 can be adjusted for art works 12 of various sizes. The sensor 26 and switch 24 combination preferably are mounted within a triangular protrusion 46 at the backboard 32 lower edge, the protrusion 46 being notched to engage and support the painting 12 lower edge. This protrusion 46 is preferably notched to catch and support the painting 12 lower edge. As a person approaches apparatus 10 the sensor 26 activates the switch 24 to close the power circuit 18 and cast light on the painting 12.

Second Preferred Embodiment

For photographs, the work support structure 20 includes a housing 50, the upper portion of which is a generally rectangular translucent panel 52 bent at its middle region into an inverted V-shape to present two opposing photograph mounting surfaces 52a. See FIGURES 4-6. The translucent panel 52 is preferably formed of frosted acrylic. Translucent panel 52 fits onto a housing 50 lower portion having generally triangular end walls 54 sized and shaped to fit snugly across the interior of the translucent panel 52 V-shape, and having front and rear walls 62 and 64, respectively, shorter than end walls 54 so that translucent panel 52 completes and closes the front and rear of housing 50, and having a removable bottom wall 66 and a top wall 68 with a wall port fitted with a

removable clear acrylic insert 68a which is optionally tinted. A power source 16 is a battery pack resting on top of bottom wall 66, and power circuit 18 wires extend from the battery pack to the light source 22 and the sensor 26, timer 14 and switch 24 combination. Light source 22 is as described above and is retained within housing 50, oriented upwardly to direct light into translucent panel 52 and out through the mounting surfaces 52a. Sensor 26 is preferably fit into a port within housing front wall 62, surrounded by a decorative triangular photograph supporting protrusion 46. Should the user prefer not to have the work 12 illuminated each time someone approaches, he or she can simply mount the work 12 on the rearward facing mounting surface 52a and turn apparatus 10 around so that the sensor 26 faces a building wall.

Photographs 12 are inventively provided with high pigment intensity and selected brightened areas A, for illuminated display. See FIGURES 7-8. Photographs 12 are composite digital images I, and one is printed on a photograph sheet S outward face and the other is matchingly reversed and aligned printed on the sheet S inward face so that light from the light source 22 passes through both, doubling the pigment intensity to look like the original work. Selected areas A of the image on the sheet S inward face are omitted or lightened, so that more light passes through these areas, giving them greater brightness than surrounding areas of the composite image I. Alternatively, pigmentation in selected areas A is increased relative to the rest of the image, so that less light light passes through areas A, for darkening areas of a the composite image I which one would expect to appear darker. This selective brightening can create a dramatic effect by brightening candle and sunlight representations in the composite image I. Alternatively, the composite image I photograph may be a conventional photograph with an image on its forward face and a transparent film sheet placed behind the photograph having a reversed image aligned with the photograph image to produce the composite image when

light is shined through the photograph and film.

Third Preferred Embodiment

A painting print and photograph 12 displaying embodiment is provided which displays a photographic image I on only one, forward face. See FIGURES 9-11. For this embodiment, the work support structure 20 includes picture frame 70 containing a frosted acrylic mounting panel 78. Panel 78 is optionally tinted. Against the mounting panel 78 is placed a border matt M, and matt M can be of any color or design desired for aesthetic matching with the print or photograph 12. The frame 70 is fitted with a generally dish-shaped backpanel 72 having at its center the light source 22 as described above oriented to cast light forwardly through the photograph 12. Power circuit wiring 18 extends from the light source 22 through backpanel 72 into battery recesses 74 to battery terminals (not shown) between which D batteries are mounted. An upright battery recess 74 is preferably along each side of the rear face of backpanel 72. Backpanel 72 includes a propping flange 76 extending from the back.

Fourth Preferred Embodiment

For glass sculpture 12 such as the commercial art found in high quality perfume bottles, the work support structure 20 includes a cylindrical hollow pedestal 80 containing power circuit 18, with light source 22 oriented to cast light upwardly and with sensor 26 mounted in an opening in the front of pedestal 80. See FIGURES 12-15. Pedestal 80 has a horizontal top wall 82 with an upper surface on which the work 12 is placed, and the top wall 82 includes a diametrically elongate light passing opening 84. Pedestal 80 also has a tubular side wall 86 and a removable bottom wall 88 on which power source 16 in the form of a battery pack rests. Activation of the light source 22 by the sensor 26 causes light to pass through light passing opening 84 into the bottom of a glass sculpture art work 12 resting on top wall 82, and the light is defracted and scattered throughout the interior of the work 12. Such illumination highlights corners, irregularities in

configuration and tinting to fully reveal the details of the work 12, which appears to glow from within.

Fifth Preferred Embodiment

For an opaque sculpture 12, the work support structure 20 includes a cylindrical hollow pedestal 90 containing power circuit 18, with sensor 26 mounted in an opening in the front of pedestal 90. See FIGURE 16. Pedestal 90 has a horizontal top wall 92 with an upper surface on which the work 12 is placed. Light source 22 is of the type generally described above including the reflector and is pivotally mounted between brackets 94 extending upwardly from one end of the upper surface of top wall 92 and oriented to cast light toward the work 12. Pedestal 90 also has a tubular side wall 96 and a removable bottom wall 98 on which power source 16 in the form of a battery pack rests. Activation of the light source 22 by the sensor 26 causes light to radiate from light source 22 toward work 12. Such illumination highlights corners and irregularities in configuration to fully reveal the details of the work 12.

As mentioned above, FIGURE 17 shows a block diagram of the preferred circuit and elements. These include the passive infrared sensor, described in the paragraphs above.

Also included is a signal amplifier. The signal from the passive infrared sensor is very small. The signal is amplified by a two-stage signal amplifier so that it is large enough to be used by the remaining parts of the assembly. Each amplifier has a gain of x100 for a total for a total amplification factor of 10,000. The signal between these two amplifier stages is AC coupled and referenced to half the battery voltage.

A microprocessor is included. Control of the circuit is provided by an on-board microprocessor. This microprocessor executes instructions that have been preprogrammed into its internal memory. Each of the features of the assembly is programmed into this microprocessor. The microprocessor performs the following tasks: (1) monitoring the amplified sensor signal for

activity; (2) turning the lamp ON or OFF at the proper time; (3) monitoring the battery voltage for a "low battery" condition; and (4) signals the user of the "low battery" condition.

The microprocessor monitors the amplified sensor signal to determine if the signal has varied enough from a non-active level to be classified as having reached an active level. The active level is defined as the level present when a person or animal is moving in front of the sensor. This microprocessor's algorithm incorporates a dead band into the level detector permitting the amplified signal to move to some degree before an active state is declared.

The circuit also includes the period timer 14. Once an active state has been determined, the microprocessor starts the period timer. If further movement of the person or animal occurs during the active period, the microprocessor resets the time for another period. The time period can be programmed from a minimum 1 second to 60 days, in the present case from 1 to 60 seconds when the power is coming from batteries and 1 to 8 hours when the power is coming from a wall transformer 102.

A logic voltage regulator is included in the circuit 18. Power for the logic portion of the apparatus 10 is supplied by the logic power voltage regulator. This 5 VDC regulator supplies power to the sensor, the time, and all other parts of the circuit 18 ex except for the lamp power.

Further provided in circuit 18 is a lamp power regulator and the switch. The apparatus is equipped with a high-efficiency switching regulator power supply circuit that converts incoming power from the unit's batteries or an optional wall transformer to a regulated power for the light source 22. The power regulator is equipped with a switch that places the regulator into a low-power standby mode when the microprocessor has turned off the light source 22.

The light source 22 is described in some detail in the paragraphs above. It is equipped with one of several types

of lamps which are switched ON and OFF as described above. These lamps may be incandescent, florescent, or electroluminescent. One of more incandescent bulbs located on the apparatus 10 may be directly driven from the lamp power voltage regulator. The florescent lamp and the electroluminescent lamp each require an additional stage of power supply to generate the required voltage and frequency.

The entire apparatus 10 is powered by standard "D" alkaline batteries. Alternate power sources are rechargeable batteries or a wall mounted transformer.

The circuit 18 is equipped with a low-battery-voltage detector circuit. The voltage detector circuit is set to detect when the batteries are substantially depleted. The microprocessor monitors the battery voltage and compares this voltage with that of the fully depleted battery voltage. When the low voltage condition occurs, this microprocessor causes the lamp to flash ON and OFF at an approximate 1 hertz rate. The flashing occurs occasionally when the low voltage condition starts. As the battery voltage gets lower, the flashing occurs continuously until the batteries are completely depleted.

Sixth Preferred Embodiment

Referring to FIGURES 18-30, an apparatus 10 for alternatingly displaying several distinct and separate two-dimensional images is disclosed, such as for advertising purposes. Apparatus 10 preferably includes a lenticular image sheet 212 printed with a series of discrete elongate image segments 214 of the several two-dimensional images, and a translucent back panel 220 behind image sheet 212 and a light source 230 laterally adjacent to or behind back panel 220 oriented to cast light through image sheet 212. The image segments 214 are mutually parallel and laterally spaced apart in a repeating sequence comprising a segment 214 of a first image, and then a segment 214 of a second image and then a segment 214 of a third image. Apparatus 10 further includes an optical barrier in the form of a lenticular lens 240 in the form of a flat sheet of

transparent material having a lens surface S embossed with an array of mutually parallel linear lens bulges 242 corresponding in width and lateral spacing with image segment 214 widths and lateral spacing; and a frame housing 250 retaining the image sheet 212 and the lens 240 in front of and substantially parallel with the image sheet 212. From each of several viewing perspectives, the image segments 214 for each given image exclusively combine or interlace with each other through the lenticular lens 240 to present each given image to the observer. Thus movement of an observer standing generally in front of the lens 240 relative to the apparatus 10 causes all and only image segments 214 of the first image to become visible through the lens 240 so that the first image appears substantially complete, and then causes all and only image segments 214 of the second image to become visible through the lens 240 so that the second image appears substantially complete, and then causes all and only image segments 214 of the third image to become visible through the lens 240 so that the third image appears substantially complete. The description of three images is merely exemplary, and presentation of more than three images or of just two images is contemplated. The image sheet 212 displayed can be a photograph as described below, a transparency, a frame of film, or a drawing on paper.

The lens 240 is preferably mounted within the frame housing 250 to be laterally movable relative to the image sheet 212 and is laterally moved by an image sheet reciprocating mechanism 216 against the biasing of an opposing spring 218, preferably in the form of a leaf spring, so that the images appear in sequence to a stationary observer. It is alternatively contemplated that the image sheet 212 be moved relative to the lens 240, such as by reciprocating mechanism 216 and spring 218. The lens 240 is moved horizontally so that the shifting position of the observer as he or she walks by the apparatus 10 does not cancel or alter the of the image from his or her perspective.

At least three, and preferably four, guide screws 222 fits through ports in forward panel 260 and through ports in the image sheet 212 and back panel 220. Guide wheels 232 fit around guide screws 222 to roll against edges of lens 240 to minimize friction resistance to lens 240 movement. Guide screws 222 are positioned relative to back panel 220 so that two first guide screws 222 fitted with guide wheels 232 define a line along which a rectilinear edge of the lens 240 is placed and one or more second guide screws 222 fitted with guide wheels 232 are spaced from this line a distance corresponding to the width of the lens 240. See FIGURES 18 and 19. Lens 240 fits slidably between the first guide screws 222 and their encircling guide wheels 232 and the second guide screw 222 and the encircling guide wheel 232.

The back panel 220 preferably is rectangular, and guide screws 222 and guide wheels 232 are preferably at each corner of the rectangle. The lens 240 is also preferably rectangular, so that two opposing and parallel rectilinear lens 240 edges ride on guide wheels 232 fitted around the first and second guide screws 222, respectively, as lens 240 slides. A forward panel 260 is preferably fitted over the forward surface S of the lens 240, having forward panel ports 262 which fit around the first and second guide screws 222. Guide screws 222 are preferably threaded at their rearward ends and fit into threaded back panel ports 224 and washers 226 preferably fit engagingly onto guide screws 222 to hold the back panel 220, lens 240 and forward panel 260 together. The guide screws 222 are secured loosely enough that friction between the lens 240 and forward panel 260 is minimal and permits sliding of the lens 240 between the image sheet 212 and forward panel 260 with minimal resistance. A coil spring 228 is optionally placed between washers 226 and forward panel 260 to create just a desired minimal amount of force against the forward panel 260 to keep forward panel 260 in contact with lens 240. Alternatively, leaf springs (not shown) may be provided between the lens 240 and forward panel 260 to

maintain this desired amount of force. The back panel 220, lens 240, forward panel 260 and guide screws 222 are all preferably made of a durable transparent plastic such as LUCITE™. Many perimeter shapes other than rectangular are contemplated, such as square, oval, circular, hexagonal and triangular, since conventional picture frames are often found in many shapes.

The frame housing 250 preferably includes a substantially dish-shaped frame panel 252 oriented substantially vertically. Frame panel 252 preferably has a rectangular perimeter panel border 254 angled radially outwardly and rearwardly to present the impression of a picture frame. A picture abutment region 256 of frame panel 252 immediately within and extending toward the center of frame panel 252 is recessed rearwardly from the front surface of the panel border 254, and a middle region of frame panel 252 encompassed by abutment region 256 is recessed rearwardly still further to create a central depression defining a battery compartment 280. A picture structure such as the backboard 220, image sheet 212, and lens 240 described above, is fitted and removably secured within panel border 254 and abuts the abutment region 256.

The essential frame housing 250 described above presents a certain avant garde appearance. For those who prefer a more traditional look, an outer conversion border 290 is provided which fits over and around panel border 254 and presents the appearance of a traditional picture frame. Outer conversion border 290 includes a rectangular or otherwise shaped elongate member 292 configured as a loop having the general shape of the frame panel 252 perimeter, and thus being typically rectangular. Outer conversion border 290 has a forward molding 294, the forward surface of which is parallel with the lens 240 or is optionally beveled rearwardly and radially inwardly and forward molding 294 is mitered at its corners. An integral receiving perimeter flange 296 extends rearwardly from and along the forward molding 294, and is spaced radially outwardly from the forward molding 294 inner edge to create

a frame housing receiving step 302 along the forward molding 294 rear surface. The frame panel 252 fits closely within the receiving step 302 and is contained by the perimeter flange 296. The perimeter flange 296 is optionally sized along its radially inward surface to make snug perimeter contact with frame panel 252 so that friction removably holds frame panel 252 within perimeter flange 296. Additionally, there are provided bendable tab elements 304 as commonly found on conventional picture frames which are rotated to extend directly behind the frame panel 252 and thus to prevent the frame panel 252 from sliding out of perimeter flange 296.

Specifically for the lenticular lens version of the image structure, the frame housing 250 may be a frame panel generally as described above but the battery compartment is tapers linearly from opposing sides in the manner of a wedge to an inverted peak which receives a rear light source 230 in the form a bulb as described herein, containing and mounting the bulb 230 and batteries 330. See FIGURE 25. A break is provided along the panel border for receiving the reciprocating mechanism 216.

An inner conversion border 310 is optionally provided which is a looped elongate member 312 shaped and sized in perimeter to fit snugly within the open forward end of frame panel 252, over the lens 240 and over the image sheet 212. Inner conversion border 310 is used where the image is substantially smaller than the lens 240, and serves to bring the frame inner edge closer to the image.

Batteries 330 are provided and are preferably of the rechargeable type and of a substantially planar configuration to fit compactly into battery compartment 280. Batteries 330 are connected to power circuit wiring 332 and thus to a PC board 334 which is contained within the battery compartment 280 and the wiring 332 in turn connects to a charger outlet 336 mounted in a frame panel wiring port 342 to face outwardly and rearwardly. A charger 340 is provided in the form of a box containing a transformer and having a first charger wire 344 extending

to frame panel 252 and having a first charger wire plug 346 which removably plugs into a charger outlet 352 wired to circuit wiring 332, and having a second charger wire 354 for extending to a room wall outlet and having a conventional outlet plug 356 at its end for plugging into the room wall outlet. Charger 140 is connected only when batteries 330 become low, which might happen no more than once a month, and charged for several hours to give the batteries 330 a full charge.

Light source 230 is preferably a very narrow fluorescent light bulb, and is connected by power circuit wiring 332 to the batteries 330 and optionally to a motion sensor 360. Motion sensor 360 is preferably two motion sensors pointing out in diverging directions to widen the range of motion detection. A bulb notch 358 or groove extends along and into an edge of back panel 220, and is preferably secured with a clip 362 as shown in FIGURE 23, so that illumination of the bulb 230 casts light into and through back panel 220, and through image sheet 12. The bulb 230 preferably is either part number P/N WL-CFL14115 or P/N WL-CFL14070, by WAMCO, INC™, which are both narrow diameter fluorescent bulbs.

As indicated above, the picture structure placed into frame panel 252 is optionally of the image shifting type described above. Alternatively, the picture structure is of the general type described in the parent to the present application, including a fixed photograph of a scene or of a painting.

For this second version, photographs are inventively provided with high pigment intensity and have selected brightened areas, for illuminated display. The photographs are composite digital images I, and one is printed on an image sheet 212 outward face and the other is matchingly reversed and aligned printed on the image sheet 212 inward face so that light from light source 230 passes through both, doubling the pigment intensity to look like the original work. Selected areas of the image on the image sheet 212 inward face are omitted or lightened, so that

more light passes through these areas, giving them greater brightness than surrounding areas of the composite image I. Alternatively, pigmentation in selected areas is increased relative to the rest of the image, so that less light passes through areas, for darkening areas of a the composite image I which one would expect to appear darker. This selective brightening can create a dramatic effect by brightening candle and sunlight representations in the composite image I. Alternatively, the composite image I photograph may be a conventional photograph with an image on its forward face and a transparent film sheet placed behind the photograph having a reversed image aligned with the photograph image to produce the composite image when light is shined through the photograph and film.

Motion sensor 360 is mounted to the frame housing 250 and directed to sense motion generally forwardly of apparatus 10. Motion sensor 360 is integrated into the battery power circuit wiring 332 so that the light source 230 and reciprocating mechanism 216, if any, are activated only when movement such as of a possible observer is sensed. A timer circuit element (not shown) is also incorporated into the power circuit wiring 332 or motion sensor 368 to shut off power to the light source 230 and reciprocating mechanism 216 after a certain amount of time has passed since motion was last detected, such as perhaps ten seconds.

A table top stand 380 is preferably provided. The stand 380 preferably includes a mounting block 382 of material such as plastic having a mounting notch 384 in its upper surface for removably receiving an edge of the frame panel 252 or outer conversion border. The notch 384 is of sufficient depth and fits closely enough around the edge to hold frame panel 252 upright and oriented to position the frame panel 252 at a desired angle relative to vertical for suitable image display. Frame panel 252 tilts back slightly from horizontal, for example. The mounting block 382 preferably tapers upwardly to have essentially the configuration of a wedge with its tapered end upturned, and

the notch 384 may be in or adjacent to the block 382 upper end. All edges of the frame housing 250 and are preferably configured to fit into the mounting block notch 384. Whether mounted in the mounting block 382 or on a building wall, a rectangular frame housing 250 can be oriented so that the frame housing 250 longitudinal axis is horizontal, such as for landscapes, or vertical, such as for portraits.

What is known as a motion barrier is optionally substituted for the lenticular lens 240 and image sheet 212. The motion barrier is static and the image varies with the angle of viewing of the observer.

While the invention has been described, disclosed, illustrated and shown in various terms or certain embodiments or modifications which it has assumed in practice, the scope of the invention is not intended to be, nor should it be deemed to be, limited thereby and such other modifications or embodiments as may be suggested by the teachings herein are particularly reserved especially as they fall within the breadth and scope of the claims here appended.

I claim as my invention:

1. A display apparatus for an art work, comprising:

a work support structure on which the art work rests;

a power source;

and an electric power circuit containing a light source oriented toward the work and a switch wired to a sensor for detecting the approach of a person, and upon detection to close said switch and thereby activate said light source to illuminate the work.

2. The apparatus of claim 1, wherein said light source is a low heat, substantially full visible spectrum light source.

3. The apparatus of claim 1, wherein said light source comprises a fluorescent bulb and reflector means adjacent to said fluorescent bulb, said reflector means being oriented relative to said fluorescent bulb to direct light from said fluorescent bulb toward the art work.

4. The apparatus of claim 1, additionally comprising a timer, wherein said sensor is connected to said timer to shut off said switch a pre-set length of time after the moment of the last detected motion.

5. The apparatus of claim 1, wherein said art work is a painting and wherein said work support structure comprises:

a backboard having a forward face against which the painting is placed and having a rearward face;

wherein said power source comprises a battery adjacent to said rearward face;

wherein said circuit comprises conduction means extending from said battery to a pair of spaced apart conductive lead rods protruding forwardly beneath and perpendicular to said backboard, said having lead rod forward ends which are interconnected by said light source, said light source being oriented to cast light toward said backboard forward face.

6. The apparatus of claim 5, wherein said backboard has a lower end, additionally comprising a protrusion at

the backboard lower end containing a protrusion port containing said sensor, said protrusion being notched to engage and support the painting lower edge.

7. The apparatus of claim 1, wherein the art work is at least one photograph, and wherein said work support structure comprises:

a housing having a housing upper portion including a substantially rectangular translucent panel bent at its middle region into an inverted V-shape to present two opposing photograph mounting surfaces;

a housing lower portion onto which said translucent panel fits, said housing lower portion having substantially triangular end walls sized and shaped to fit across the interior of the folded said translucent panel, and having front and rear walls shorter than said end walls such that said translucent panel completes and substantially closes said housing, and having a removable bottom wall;

wherein said light source is oriented to cast light upwardly into the folded said translucent panel and out through said translucent panel and through any photograph mounted against said translucent panel.

8. The apparatus of claim 7, wherein said translucent panel is formed of a frosted acrylic.

9. The apparatus of claim 7, wherein said power source is a battery pack resting on top of said bottom wall, and said power circuit comprises wires extending from said battery pack to said light source and to said sensor, said timer and said switch.

10. The apparatus of claim 7, wherein said sensor is fit into a port within said housing front wall, surrounded by a photograph supporting protrusion.

11. The apparatus of claim 7, wherein said photograph comprises a sheet having sheet forward and rearward faces and having corresponding mirror images printed on both of said forward and rearward faces for enhanced pigment intensity when illuminated.

12. The apparatus of claim 7, wherein said photographic images comprise areas of reduced pigmentation

to permit more light from said light source to pass through said areas.

13. The apparatus of claim 7, wherein said photographic images comprise areas of increased pigmentation to permit less light from said light source to pass through said areas.

14. The apparatus of claim 1, wherein said art work is a photograph and wherein said work support structure comprises:

a picture frame for containing said art work and a substantially dish-shaped backpanel removably secured to said backboard, said backboard having said light source secured its center and oriented to cast light forwardly through said picture frame and through said work.

15. The apparatus of claim 14, additionally comprising a backpanel stand means secured to said backpanel for propping said backpanel upright on a table.

16. The apparatus of claim 14, wherein said backpanel has a battery recess and wherein said power circuit comprises circuit wiring extending from said light source through said backpanel into said battery recess, and wherein said power source is at least one battery secured within said battery recess.

17. The apparatus of claim 1, wherein the art work is a glass sculpture and wherein said work support structure comprises:

a hollow pedestal containing said power circuit and said light source, said pedestal having a pedestal side wall and a pedestal top wall with a light passing opening, said light source being oriented to cast light upwardly through said light passing opening;

wherein said sensor is fitted through a sensor opening in said pedestal;

such that activation of said light source by said sensor causes light to pass through said light passing opening into the art work resting on said top wall, and the light is defracted and scattered throughout the interior of the art work, illuminating and highlighting any corners,

irregularities in configuration and tinting in the art work.

18. The apparatus of claim 17, wherein said light passing opening is elongate.

19. The apparatus of claim 17, wherein said pedestal comprises a pedestal bottom wall which is removably fitted to said pedestal side wall for access to said light source and said power source.

20. The apparatus of claim 1, wherein said power source comprises a wall outlet, a power cord extending from said wall outlet and a transformer between said wall outlet and power cord.

21. The apparatus of claim 1, wherein the art work is an opaque sculpture and wherein said work support structure comprises:

a hollow pedestal containing said power circuit and said light source, said pedestal having a pedestal side wall and a pedestal top wall, said light source being mounted to said pedestal and being oriented to cast light upwardly through said light passing opening;

wherein said sensor is fitted through a sensor opening in said pedestal;

such that activation of said light source by said sensor causes light to radiate onto the art work resting on said top wall.

22. A method of illiminating an art work using an apparatus comprising a work support structure on which the art work rests; a power source; and an electric power circuit containing a light source oriented toward the work and a switch wired to a sensor for detecting the approach of a person, and upon detection to close said switch and thereby activate said light source to illuminate the work, comprising the steps of:

detecting the approach of a person with said sensor;

activating said light source by operating said switch upon detecting the approach of a person to shine on the art work;

and deactivating said light source by operating said

switch with said timer after a certain length of time has passed following detection of a person approaching.

23. An apparatus for sequentially displaying several distinct and separate two-dimensional images, comprising:

a lenticular image sheet printed with a series of discrete elongate image segments of at least two images, said image segments being mutually parallel and laterally spaced apart in a repeating sequence comprising a segment of a first said image, and then a segment of a second said image;

a translucent back panel behind said image sheet;

a light source oriented to cast light through said back panel;

a power source connected to said light source through a power circuit;

a lenticular lens comprising a sheet of transparent material having a lens surface embossed with an array of mutually parallel linear lens bulges corresponding in width and lateral spacing with the width and lateral spacing of said image segments;

and a frame housing retaining said image sheet and said lens in front of and substantially parallel with said image sheet, said frame housing having an open forward region through which said image sheet is visible through said lens;

such that said image segments for each given said image exclusively combine with each other through said lenticular lens to present exclusively each given image to an observer in front of said frame housing.

24. The apparatus of claim 23, additionally comprising means for causing relative movement between said lens and said image sheet.

25. The apparatus of claim 23, additionally comprising lens retaining means slidably retaining said lens within said frame housing.

26. The apparatus of claim 25, additionally comprising an lens reciprocating mechanism mounted to slide said lens within said lens retaining means such that the

images appear in sequence to a stationary observer.

27. The apparatus of claim 26, additionally comprising a reciprocation biasing spring mounted against said lens opposite said lens reciprocating mechanism for returning said lens after said lens is moved by said reciprocating mechanism.

28. The apparatus of claim 25, wherein said lens is moved horizontally by said lens reciprocating mechanism such that shifting positions of a moving observer do not cancel the change of image visible to the observer.

29. The apparatus of claim 23, wherein said lens retaining means comprises a plurality of guide screws extending rearwardly through ports in said forward panel and in said back panel, said guide screws being positioned relative to said back panel such that two first guide screws substantially define a line along which an edge of said lens is placed and a second guide screw is spaced from the line a distance corresponding to the width of said lens, such that said lens fits slidably between the first said guide screws and the second said guide screw.

30. The apparatus of claim 29, wherein said back panel is substantially rectangular, and said guide screws are located at each corner of said lens and wherein said lens is substantially rectangular, such that two opposing and parallel rectilinear lens edges ride along the first and second said guide screws, respectively, as said lens slides within said lens retaining means. 31. The apparatus of claim 30, additionally comprising a forward panel fitted over the forward face of said lens, having forward panel ports fitting over the first and second said guide screws, and wherein said guide screws are threaded at their rearward ends and fit engagingly onto threaded ports in said back panel, to hold said back panel, said lens and said forward panel together.

32. The apparatus of claim 31, additionally comprising spring means between said back panel and said forward panel to create a desired minimal amount of force against said forward panel.

33. The apparatus of claim 23, wherein said frame housing is a substantially dish-shaped frame panel oriented substantially vertically, said frame panel having a substantially rectangular perimeter panel border to present the visual impression of a frame, a picture abutment region of said frame panel immediately within said panel border and extending toward the center of said frame panel and recessed rearwardly, and a central depression defining a battery compartment encompassed by said abutment region, wherein said backboard, image sheet, and lens are fitted and removably secured within said panel border abutting said abutment region.

34. The apparatus of claim 33, additionally comprising an outer conversion border for fitting over and around said panel border, said outer conversion border comprising a rectangular or otherwise shaped elongate member configured as a loop having the general shape of said frame panel perimeter, said outer conversion border having a forward molding, an integral receiving perimeter flange extending rearwardly from and along said forward molding, and being spaced radially outwardly from said forward molding inner edge to create a frame housing receiving step along said forward molding; such that said frame panel fits closely within said receiving step and is contained by said perimeter flange;

and tab means for obstructing said frame panel from sliding out of said perimeter flange.

35. The apparatus of claim 33, additionally comprising an inner conversion border including a looped elongate member shaped and sized in perimeter to fit snugly within said frame panel, over said lens and over said image sheet.

36. The apparatus of claim 33, additionally comprising terminal wiring, a PC board and a battery charger and a battery charger outlet, wherein said electric power source comprises a battery connected to said terminal wiring and to said PC board, said PC board being contained

within said battery compartment, and said wiring being connected to said battery charger outlet and said battery charger outlet being mounted in a port in said frame panel to face outwardly from said frame panel;

and a battery charger having means for plugging into said battery charger outlet and for plugging into a building wall outlet.

37. The apparatus of claim 23, wherein said light source comprises:

a bulb notch in an edge of said back panel,

a fluorescent light bulb fitted within said bulb notch, such that said fluorescent light bulb casts light into and through said back panel and forwardly through said image sheet.

38. The apparatus of claim 33, additionally comprising a motion sensor mounted to said frame housing and directed to sense motion generally forwardly of said apparatus, said motion sensor being integrated into said power circuit such that said light source is activated only when movement is sensed.

39. The apparatus of claim 38, additionally comprising a timer circuit element incorporated into said power circuit for shutting off power to said light source after a certain amount of time has passed since said motion sensor last detected motion.

40. The apparatus of claim 33, additionally comprising a table top stand including a block having a mounting notch in its upper surface for removably receiving an edge of said frame panel to hold said frame panel upright.

41. An apparatus for sequentially displaying several distinct and separate two-dimensional images, comprising:

a lenticular image sheet printed with a series of discrete elongate image segments of at least two images, said image segments being mutually parallel and laterally spaced apart in a repeating sequence comprising a segment of a first said image, and then a segment of a second said image;

a light source oriented to cast light through said image sheet;

a power source connected to said light source through a power circuit;

a lenticular lens comprising a sheet of transparent material having a lens surface embossed with an array of mutually parallel linear lens bulges corresponding in width and lateral spacing with the width and lateral spacing of said image segments;

and a frame housing retaining said image sheet and said lens in front of and substantially parallel with said image sheet, said frame housing having an open forward region through which said image sheet is visible through said lens;

such that said image segments for each given said image exclusively combine with each other through said lenticular lens to present exclusively each given image to an observer in front of said frame housing.

42. The apparatus of claim 41, additionally comprising means for causing relative movement between said lens and image sheet.

43. An apparatus for sequentially displaying several distinct and separate two-dimensional images, comprising:

an image sheet printed with a series of discrete elongate image segments of at least two images, said image segments being mutually parallel and laterally spaced apart in a repeating sequence comprising a segment of a first said image, and then a segment of a second said image;

a translucent back panel behind said image sheet;

a light source oriented to cast light through said back panel;

a power source connected to said light source through a power circuit;

an optical barrier comprising a sheet of transparent material having a optical barrier surface embossed with an array of mutually parallel linear optical barrier bulges corresponding in width and lateral spacing with the width and lateral spacing of said image segments;

and a frame housing retaining said image sheet and said optical barrier in front of and substantially parallel with said image sheet, said frame housing having an open forward region through which said image sheet is visible through said optical barrier;

such that said image segments for each given said image exclusively combine with each other through said optical barrier to present exclusively each given image to an observer in front of said frame housing.

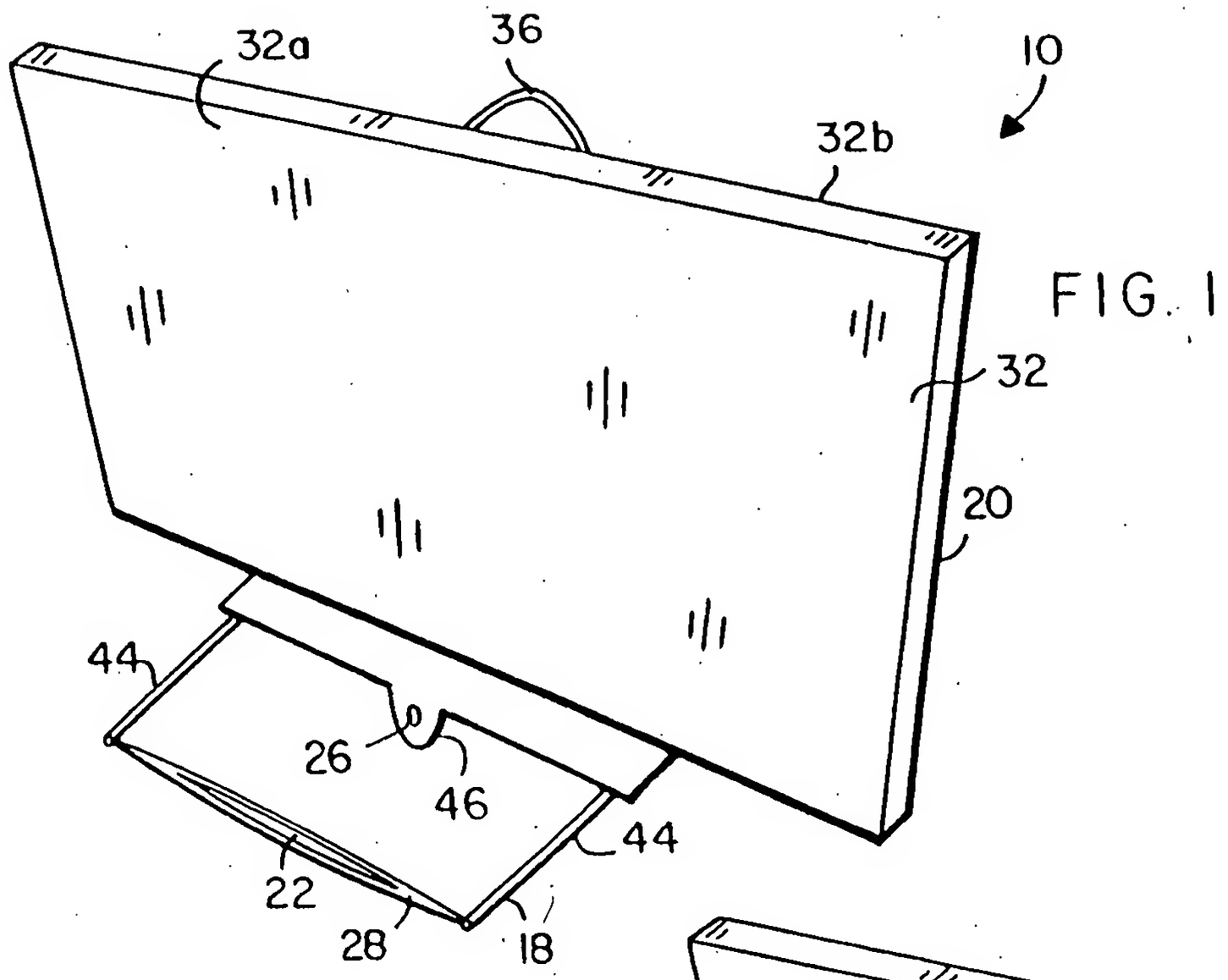
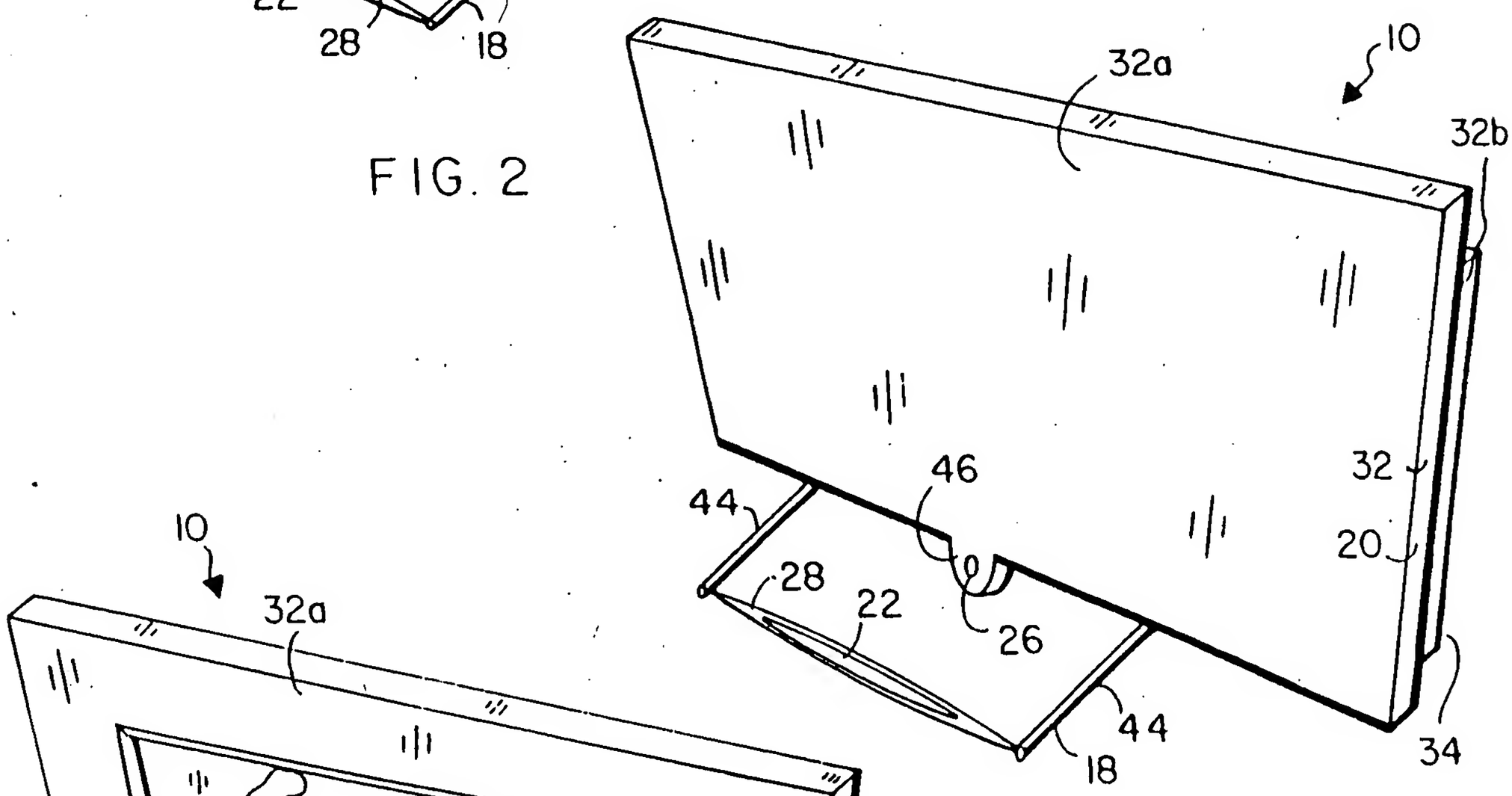


FIG. 1

FIG. 2



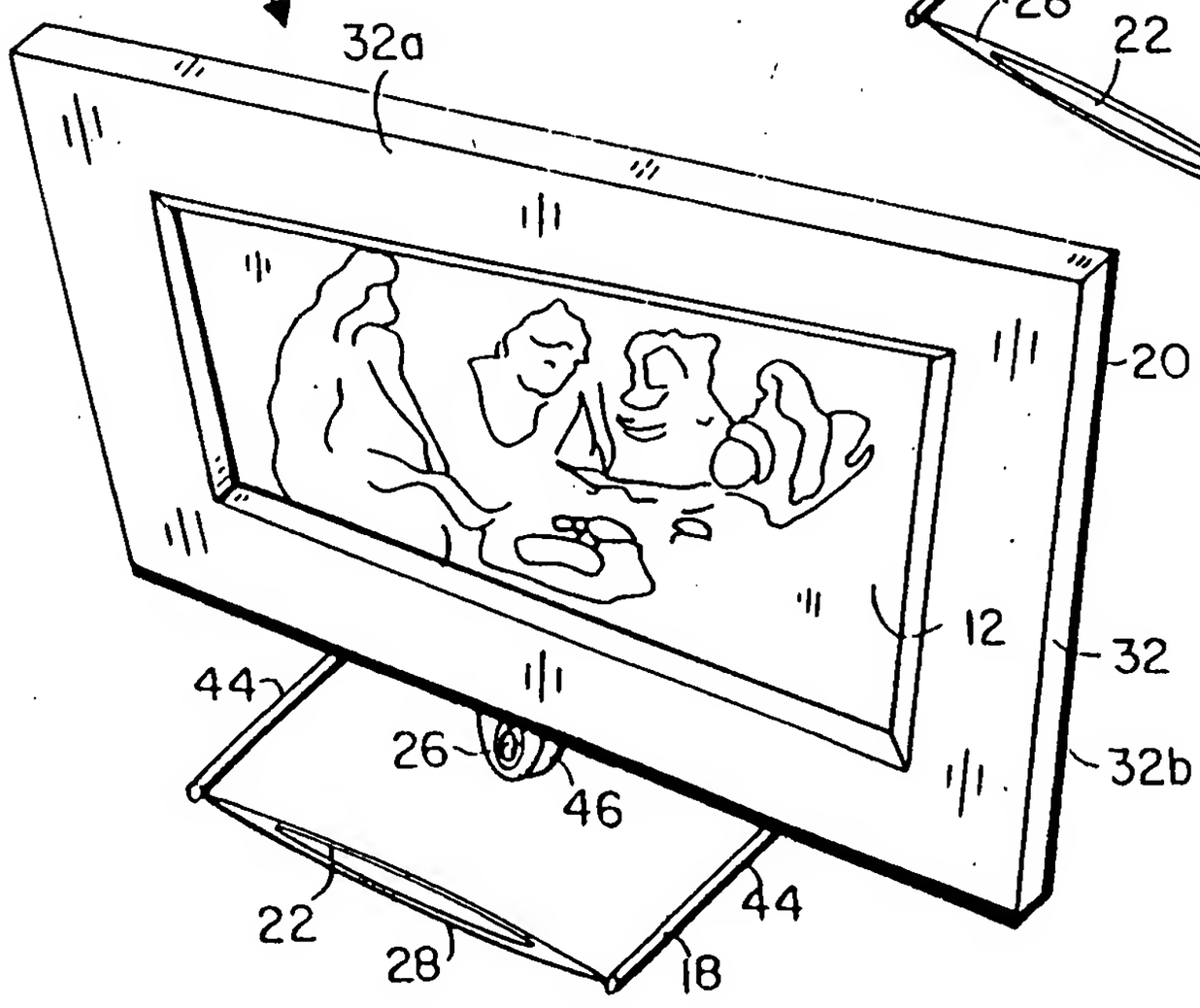


FIG. 3

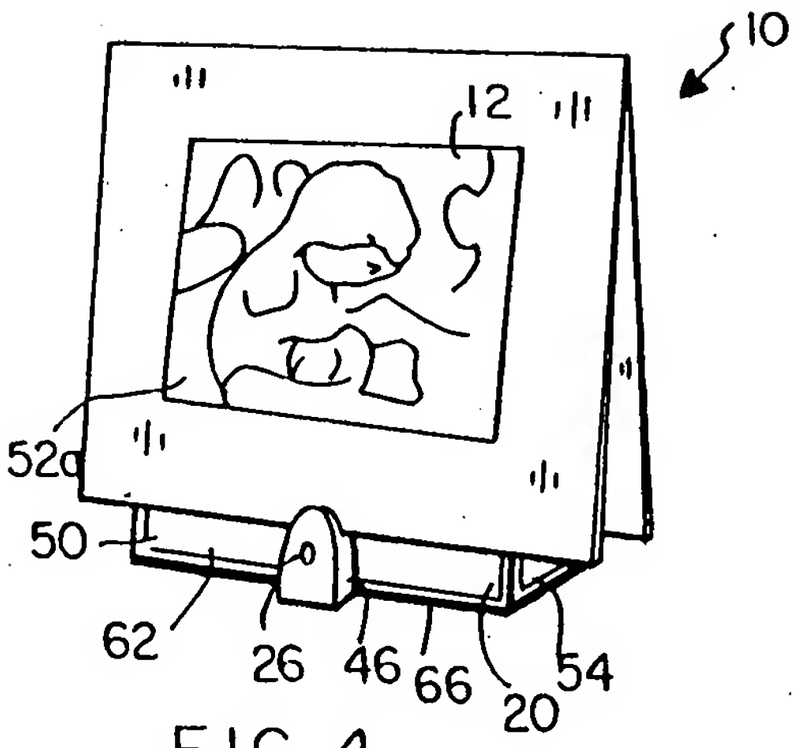


FIG. 4

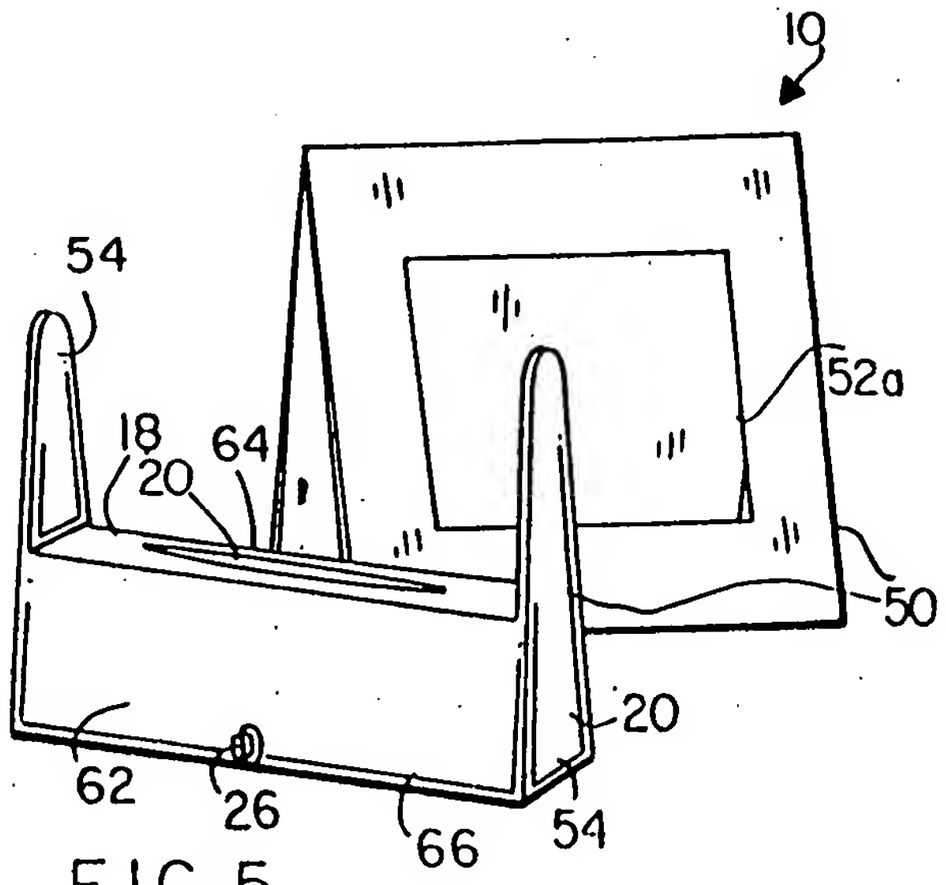


FIG. 5

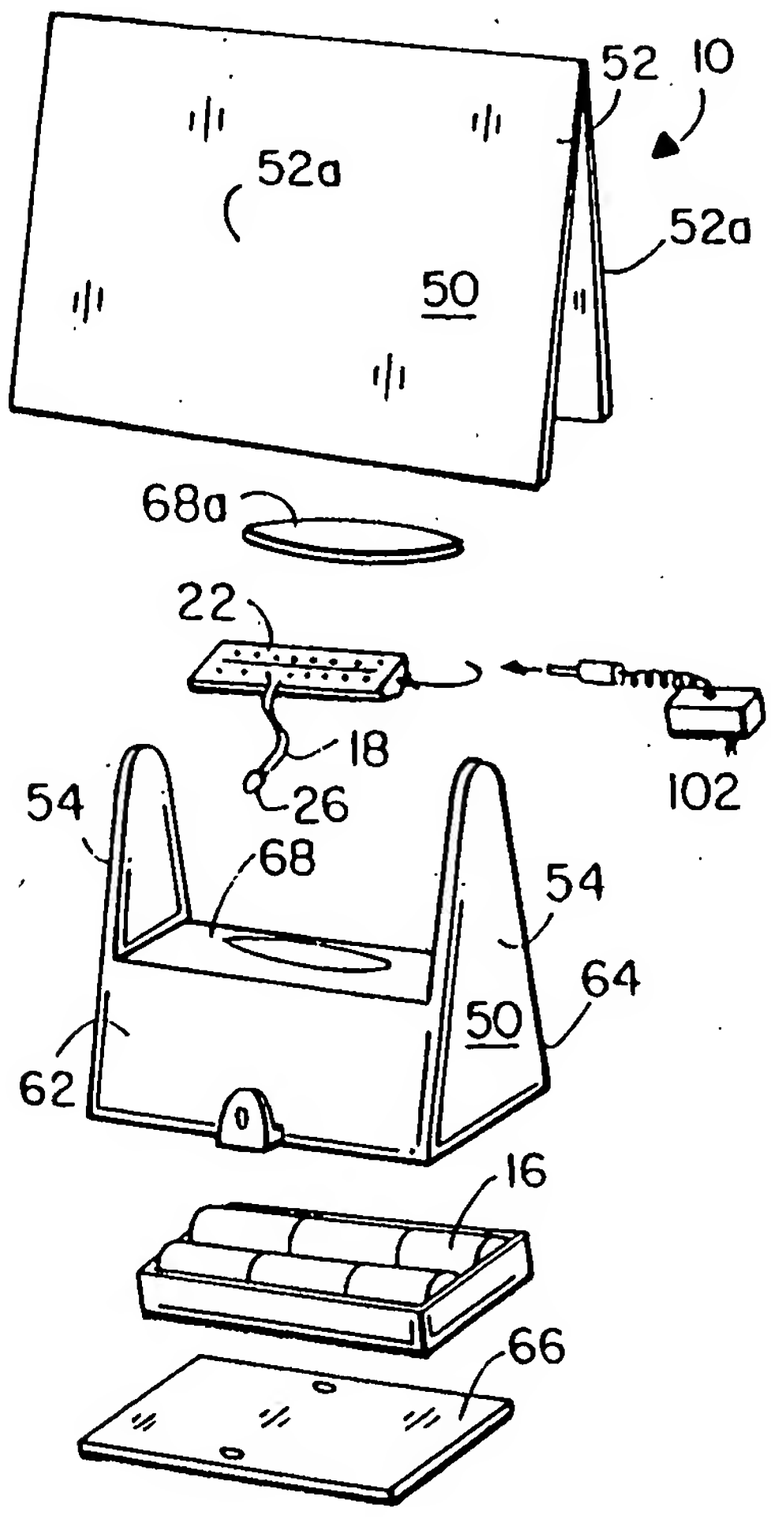


FIG. 6

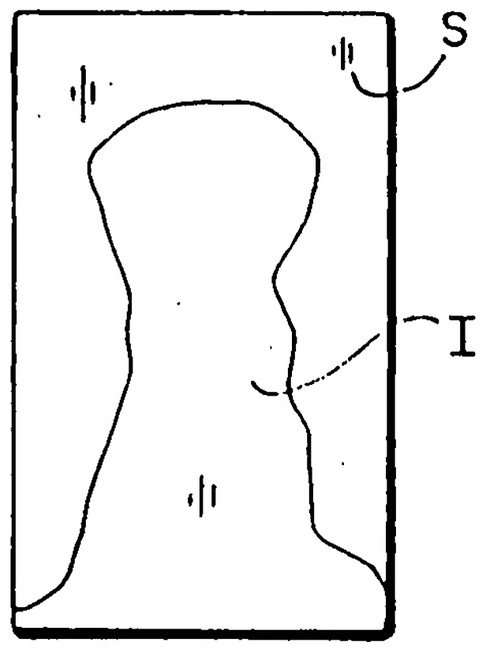


FIG. 7

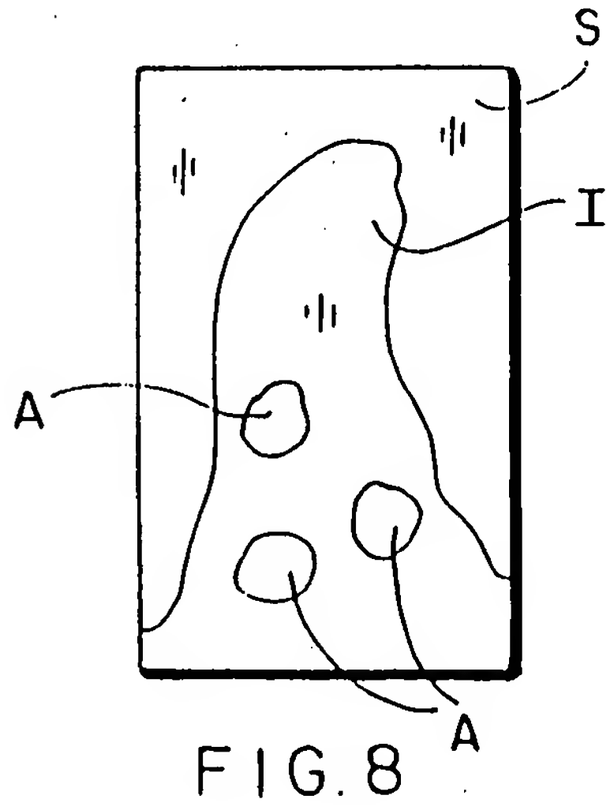


FIG. 8

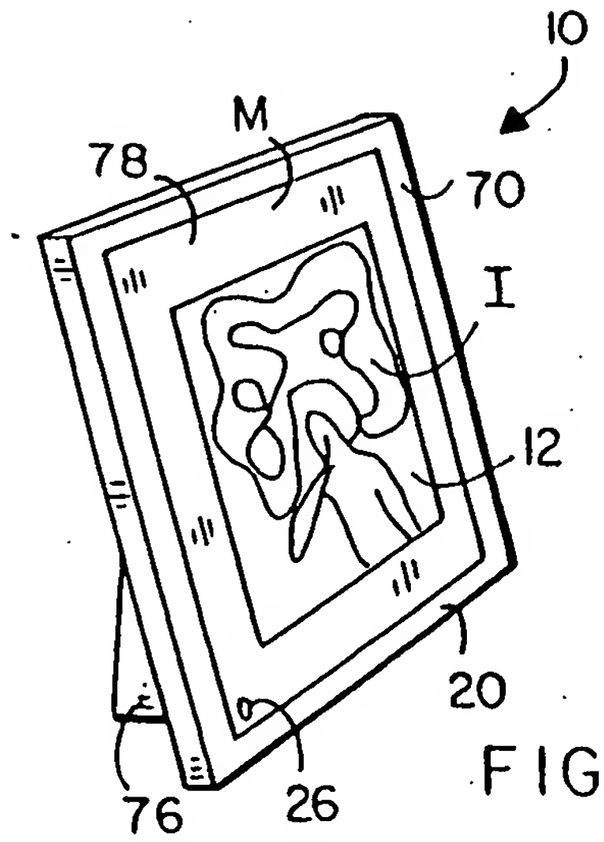


FIG. 9

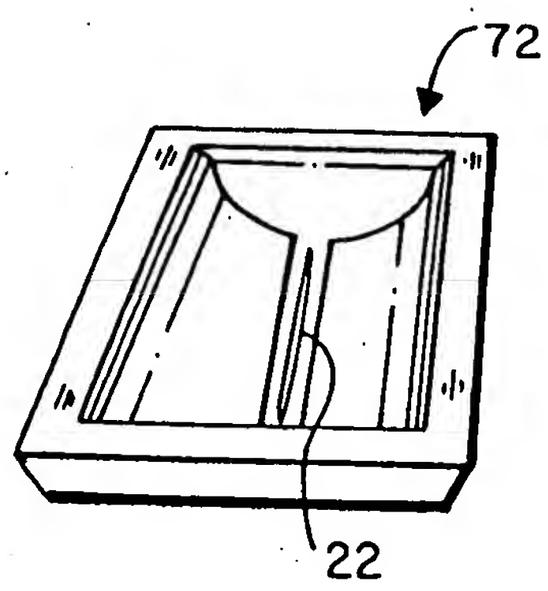


FIG. 10

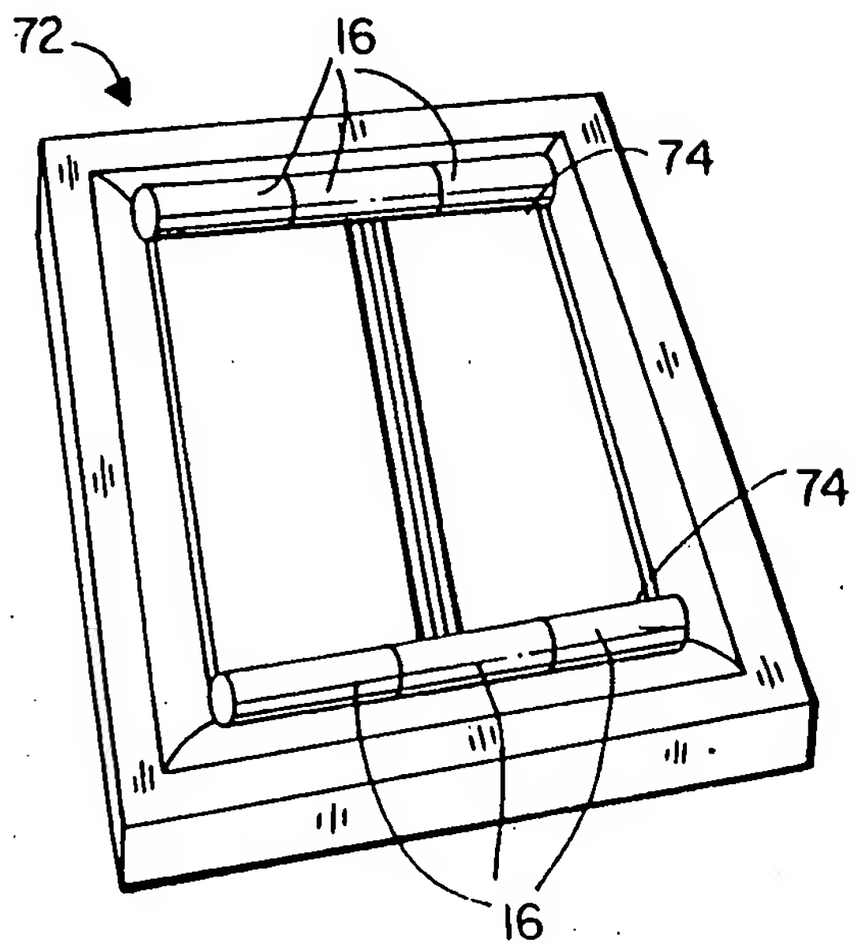


FIG. 11

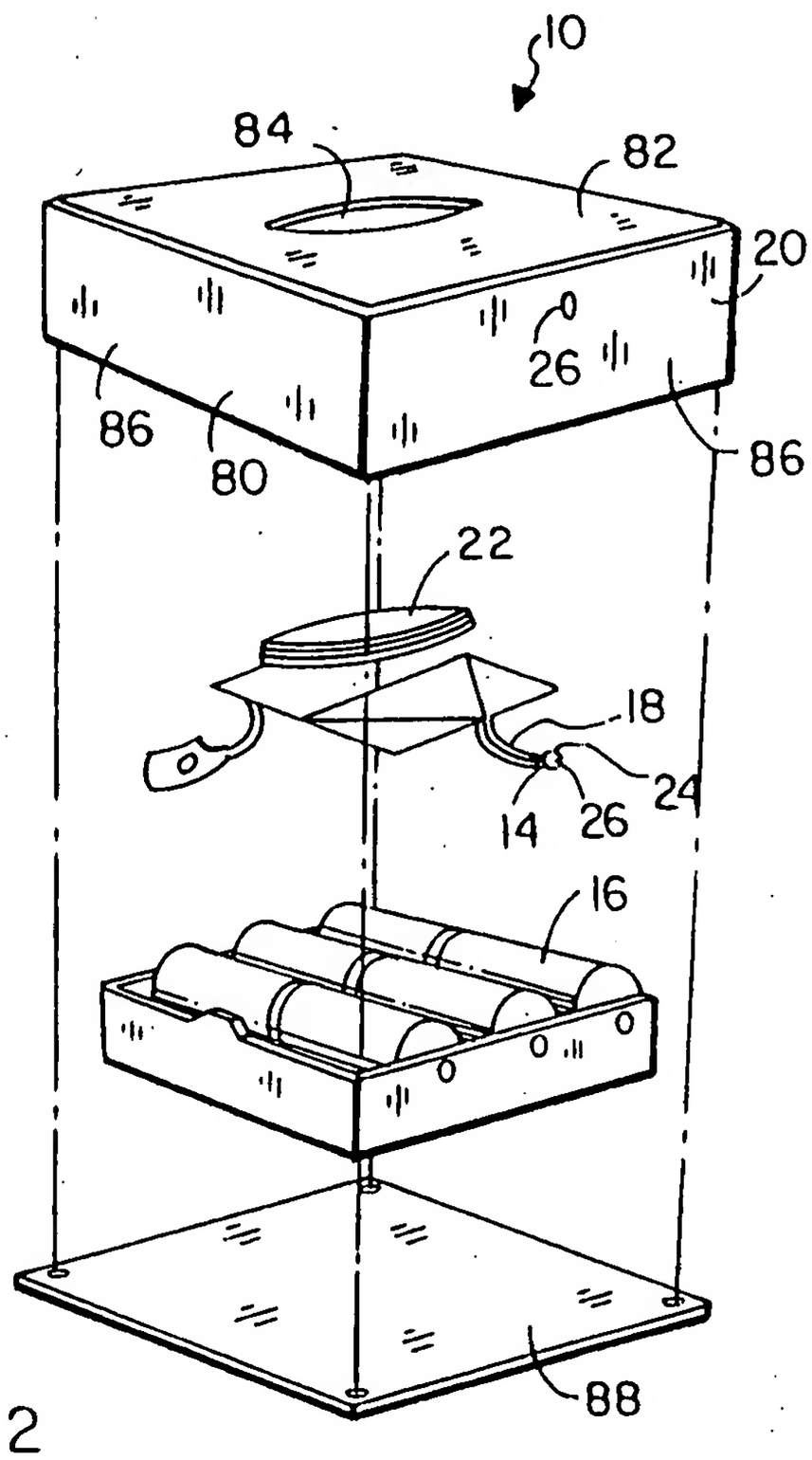


FIG. 12

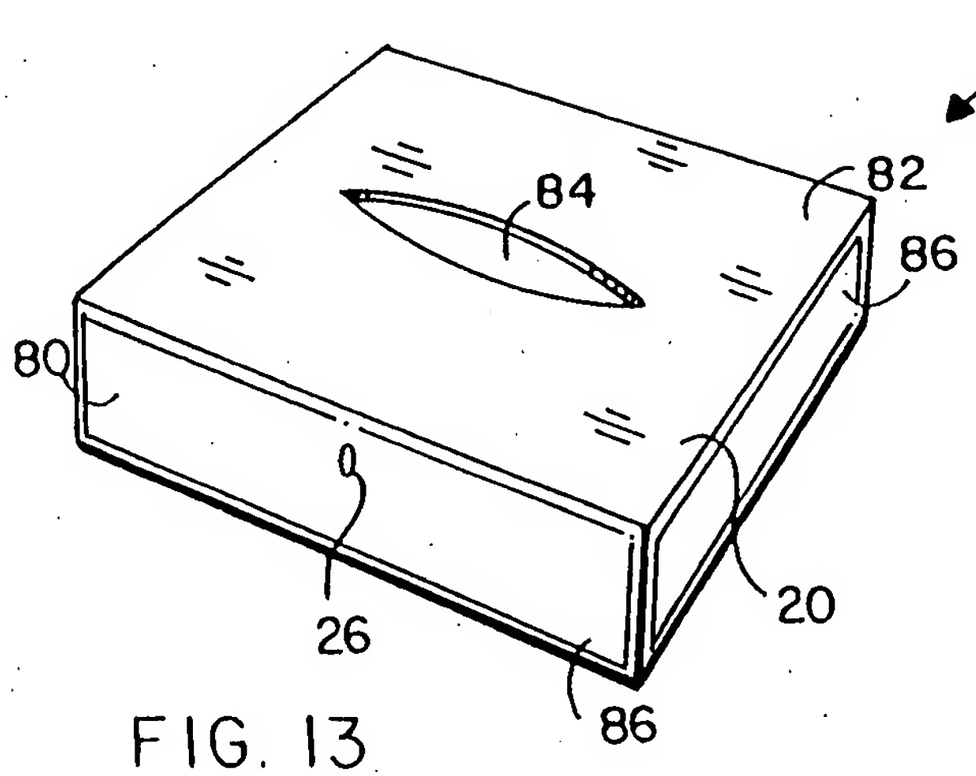


FIG. 13

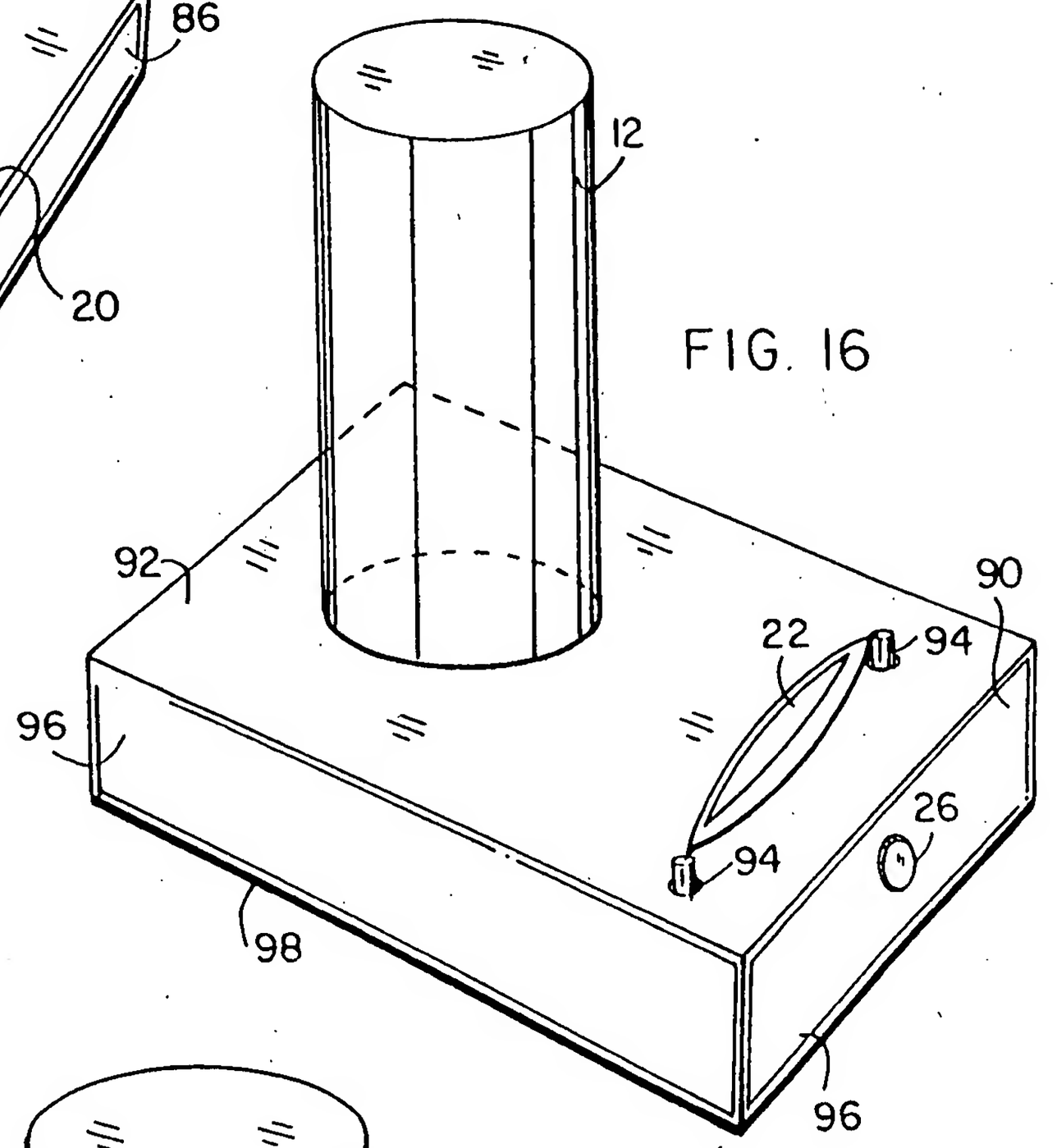
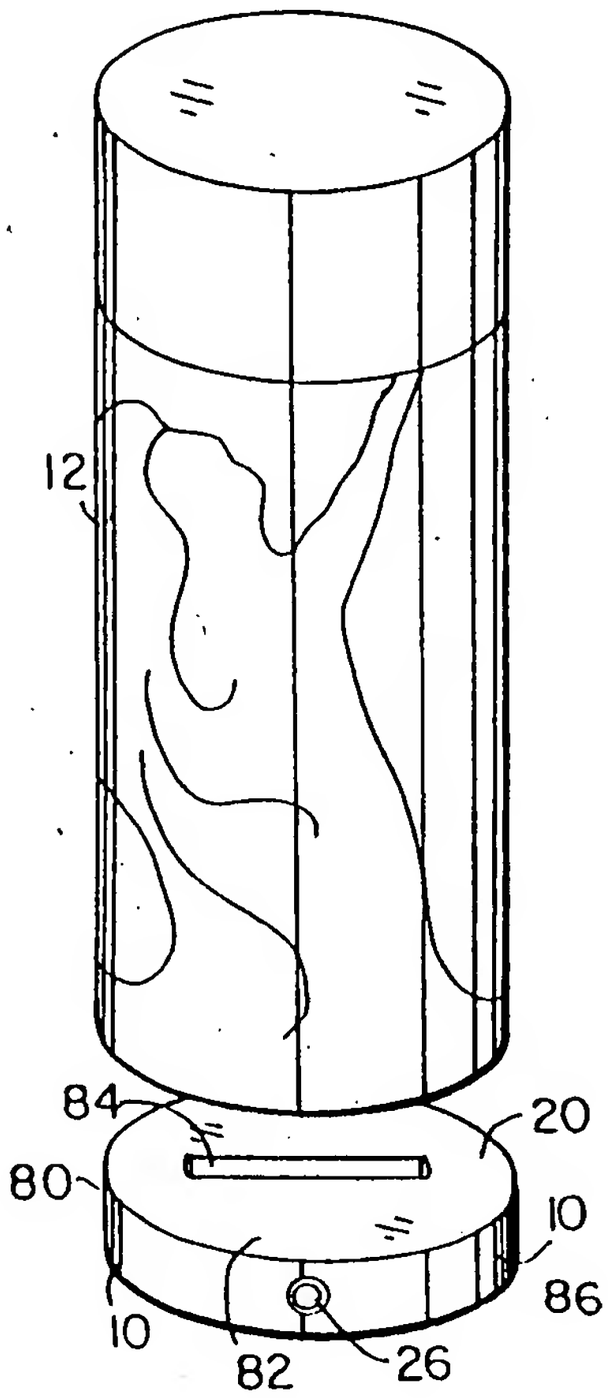


FIG. 16

FIG. 14



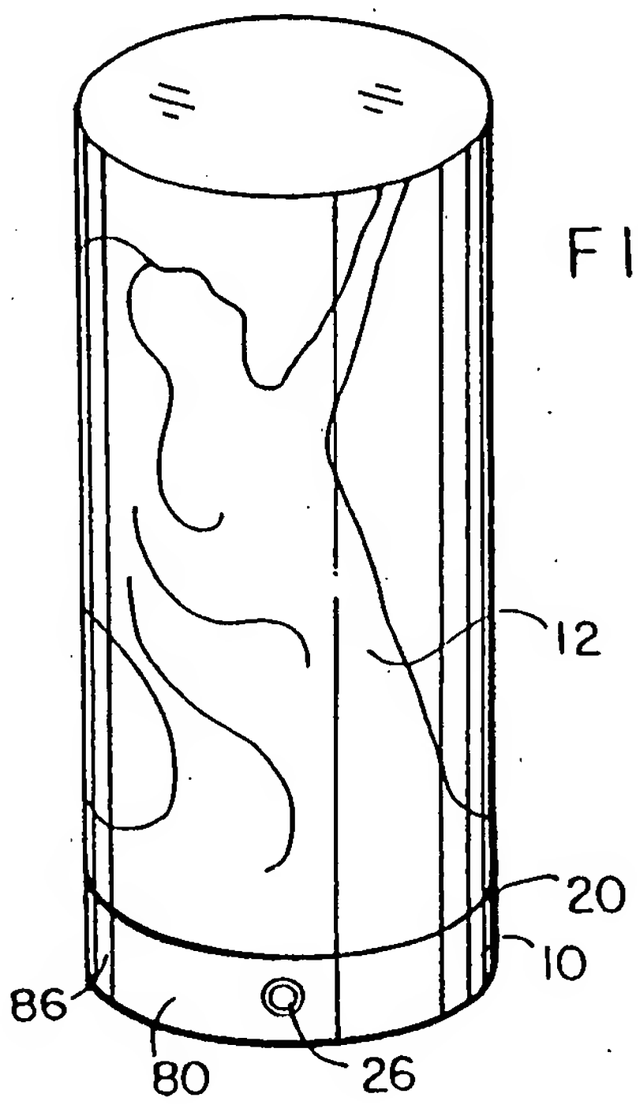


FIG. 15

FIG. 17

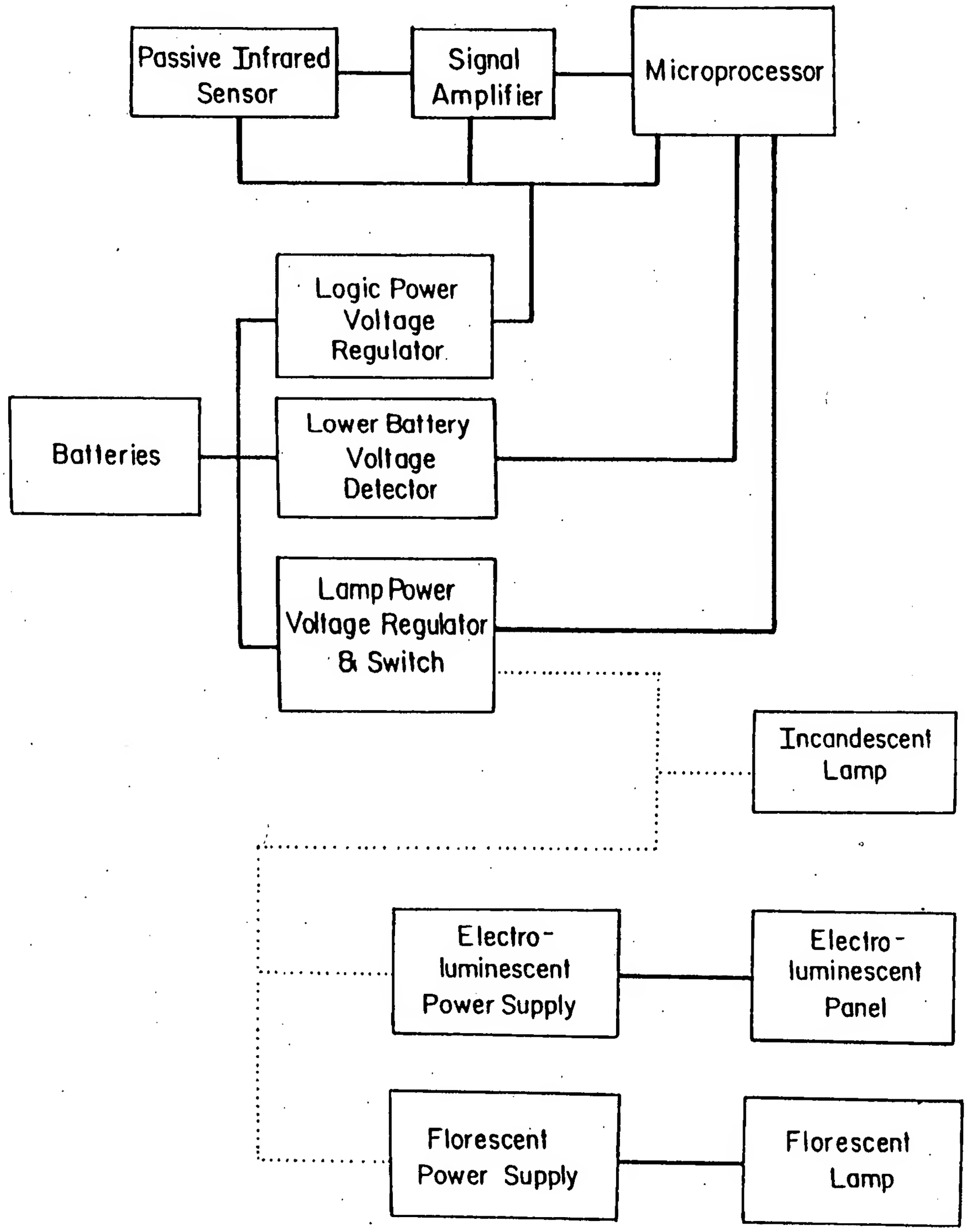

Passive Infrared Sensor
Signal Amplifier
Microprocessor
Logic Power Voltage Regulator
Batteries
Lower Battery Voltage Detector
Lamp Power Voltage Regulator & Switch
Incandescent Lamp
Electro-luminescent Power Supply
Electro-luminescent Panel
Florescent Power Supply
Florescent Lamp

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FIG. 18

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FIG. 19

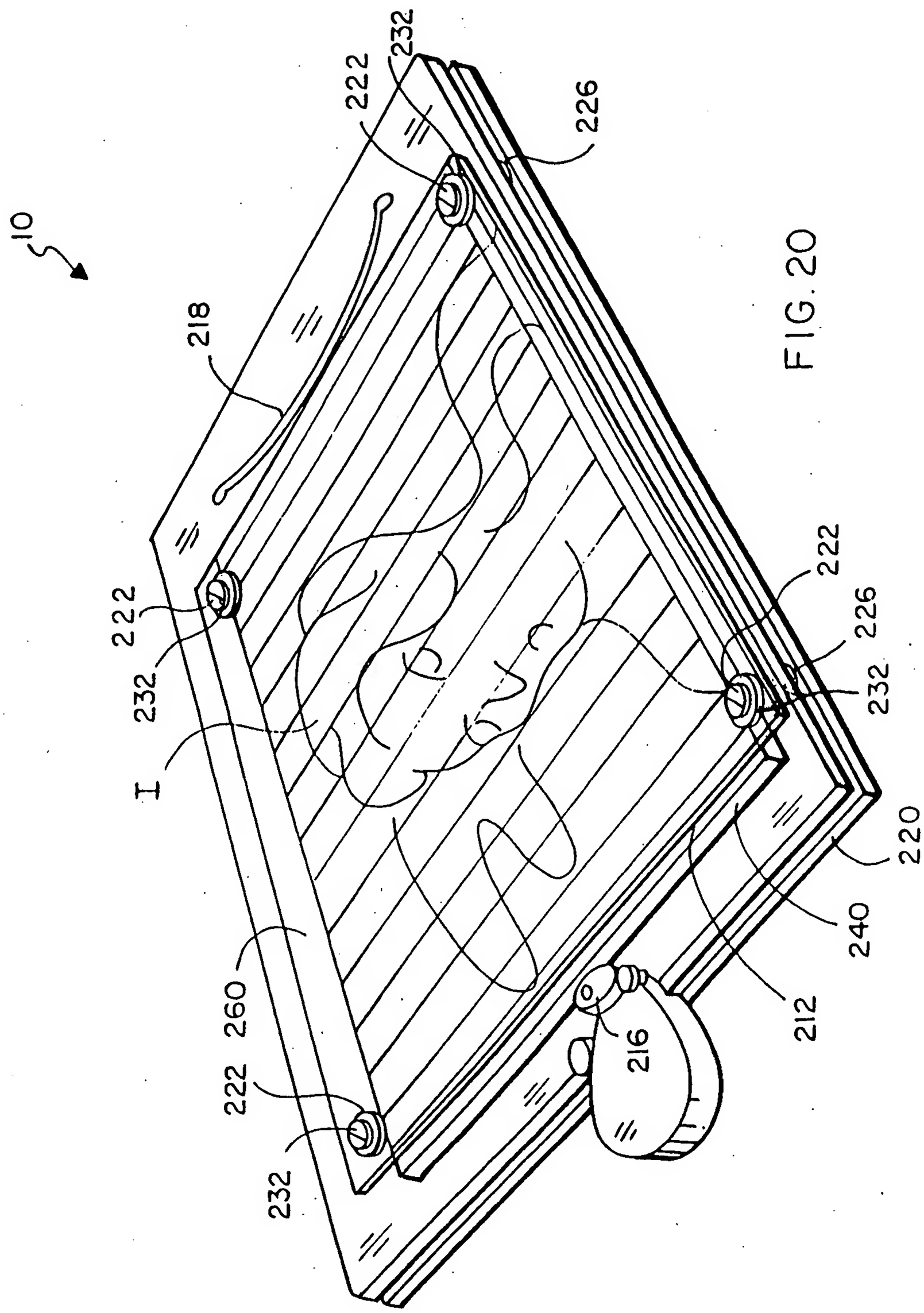
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FIG. 20

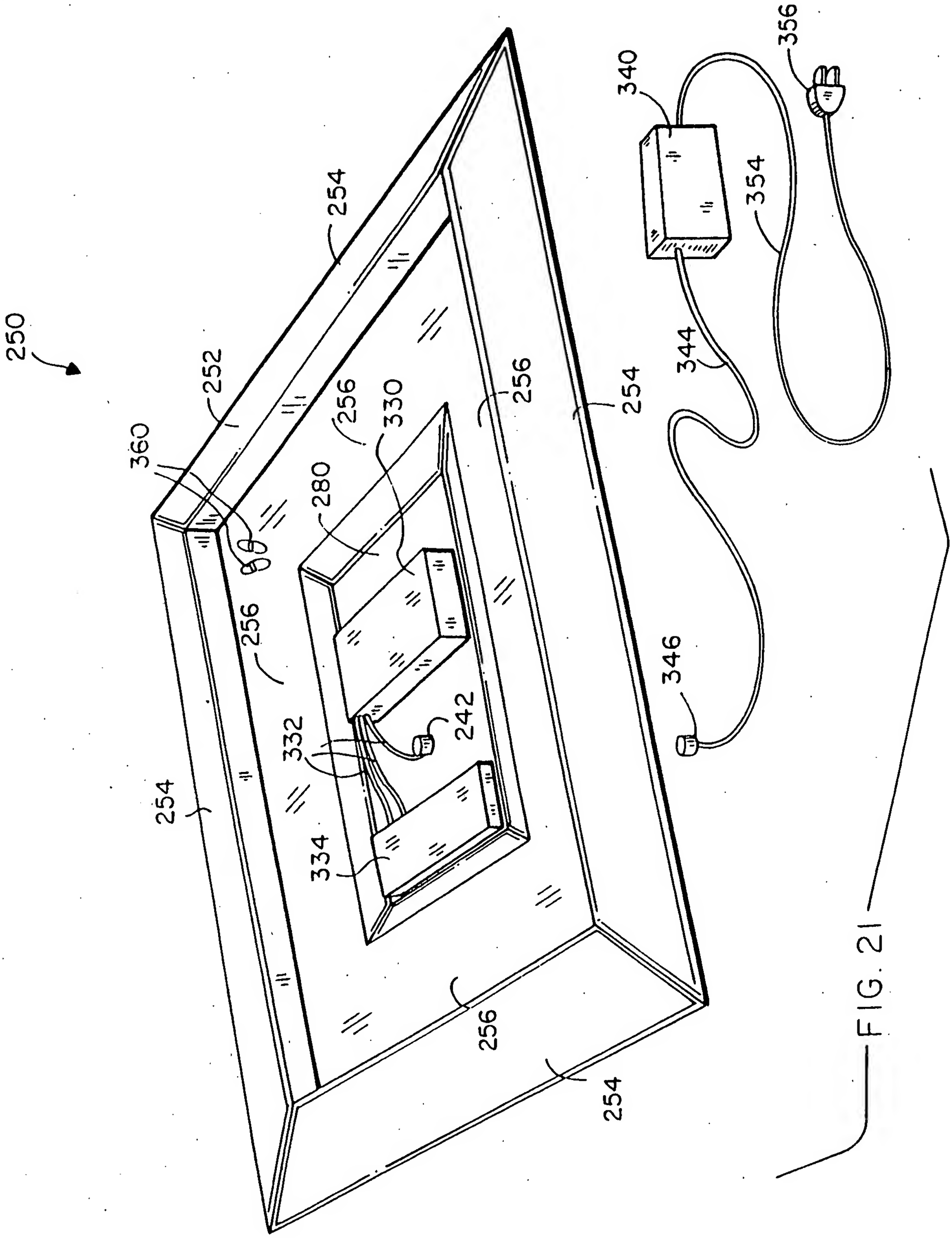

FIG. 21

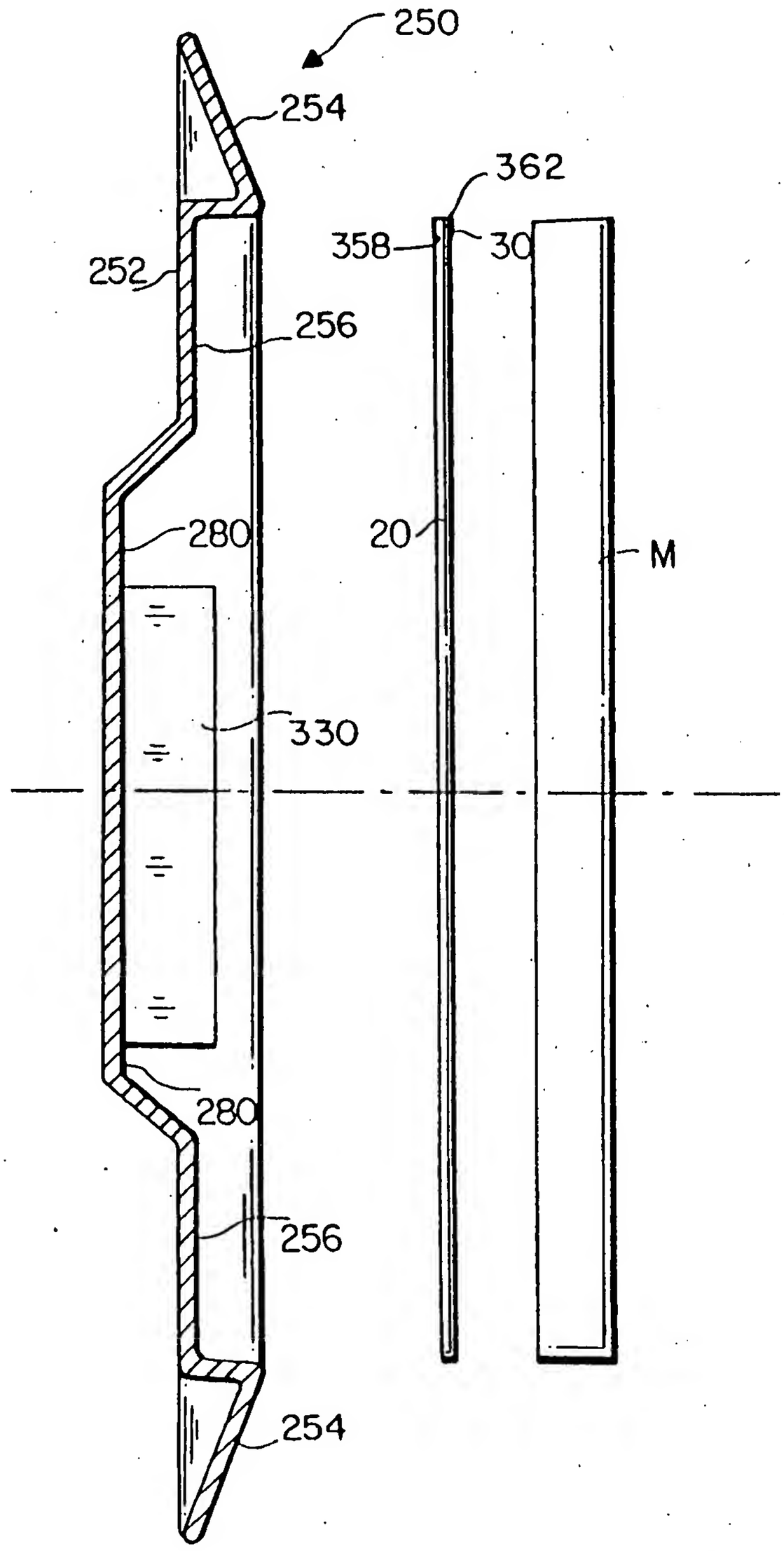

FIG. 22

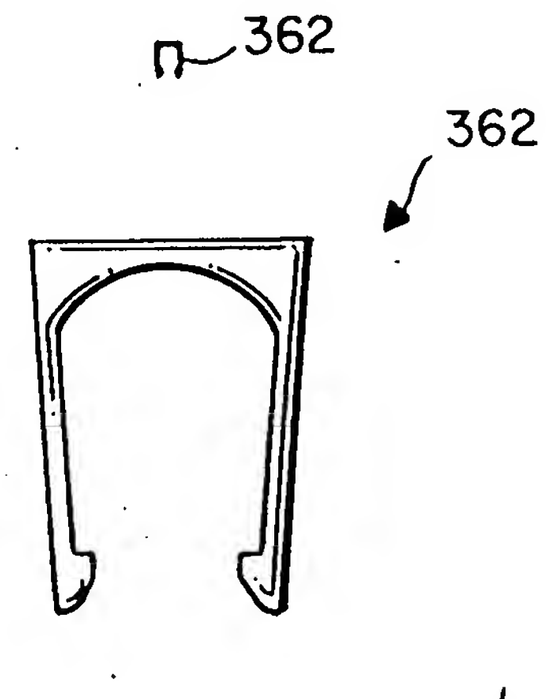

FIG. 23

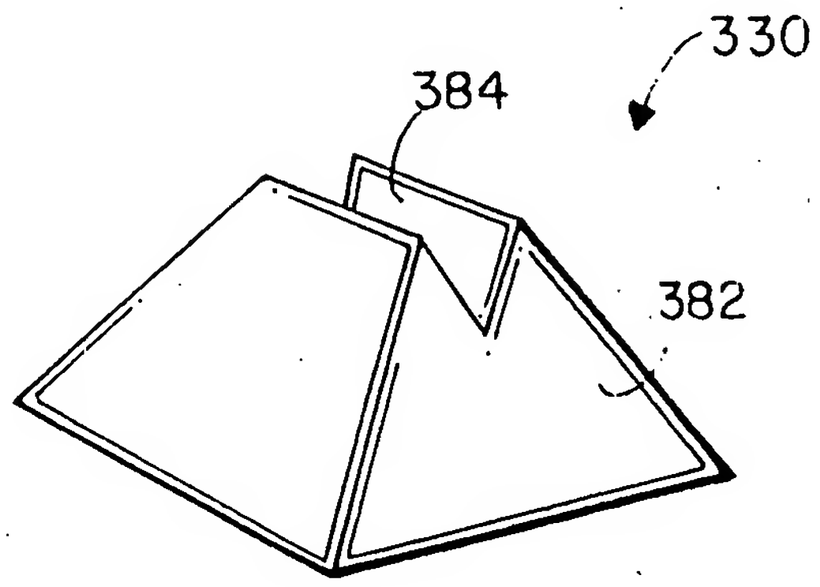

FIG. 24

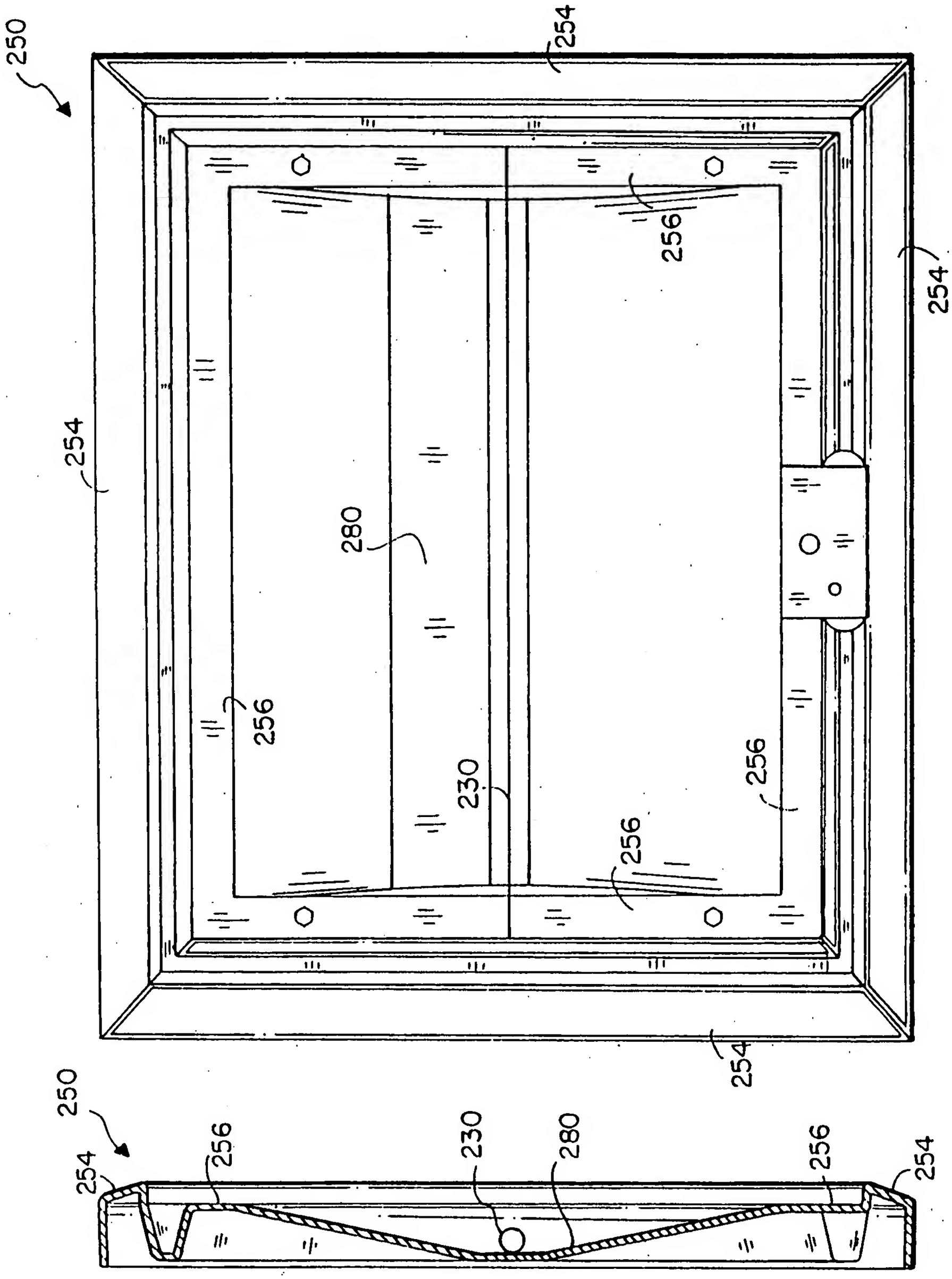
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FIG. 26

FIG. 25

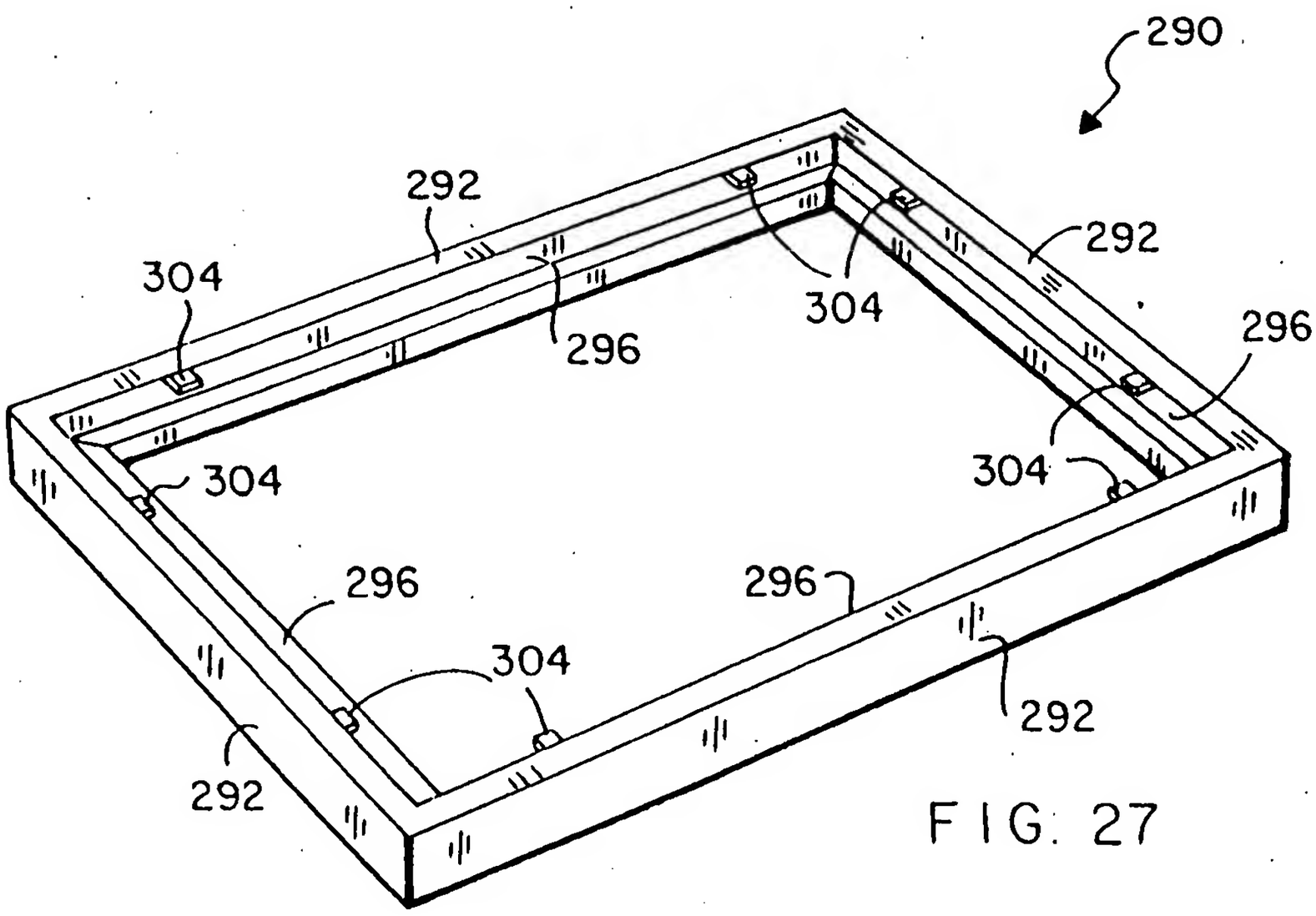
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FIG. 27

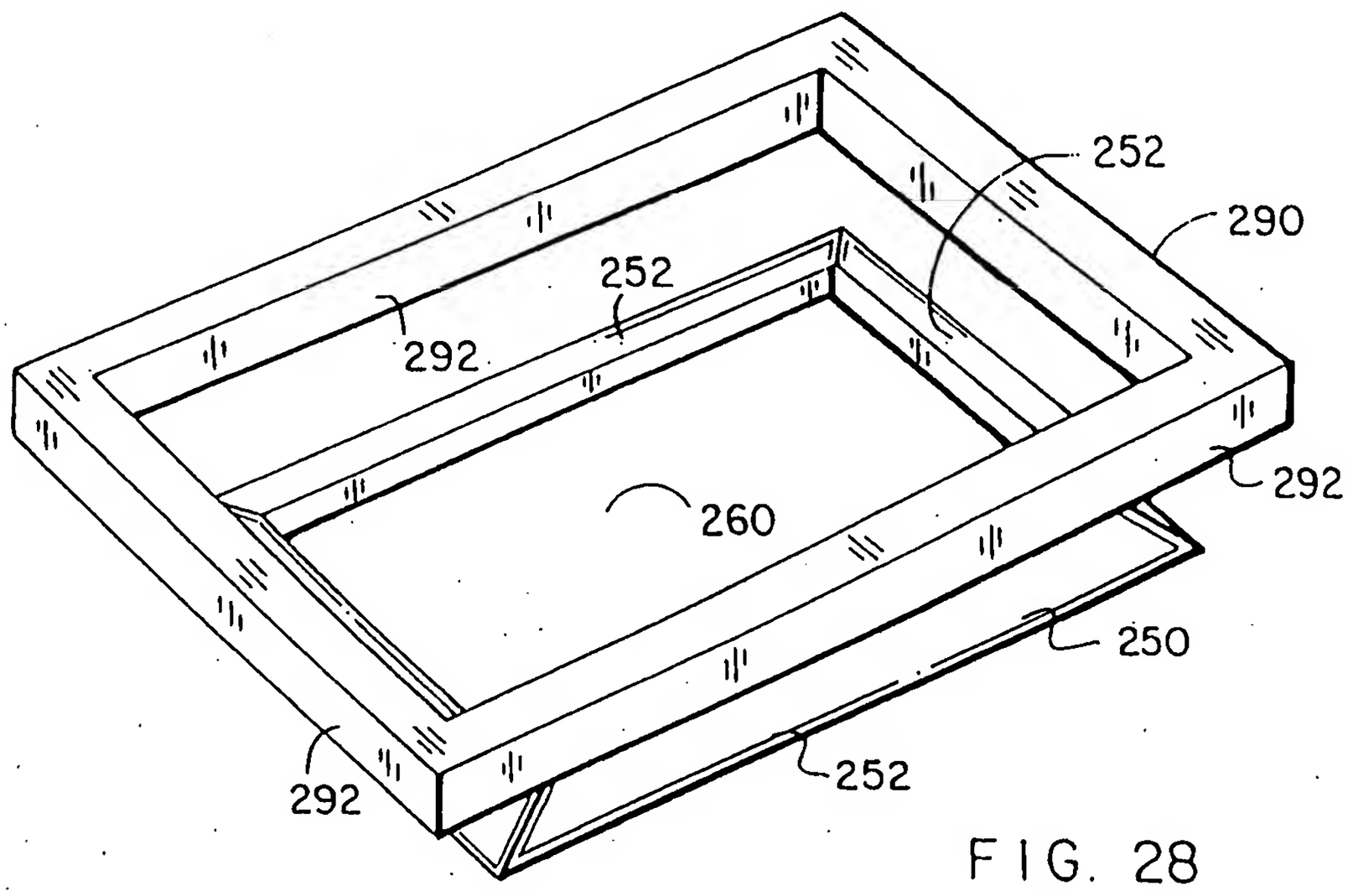
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FIG. 28

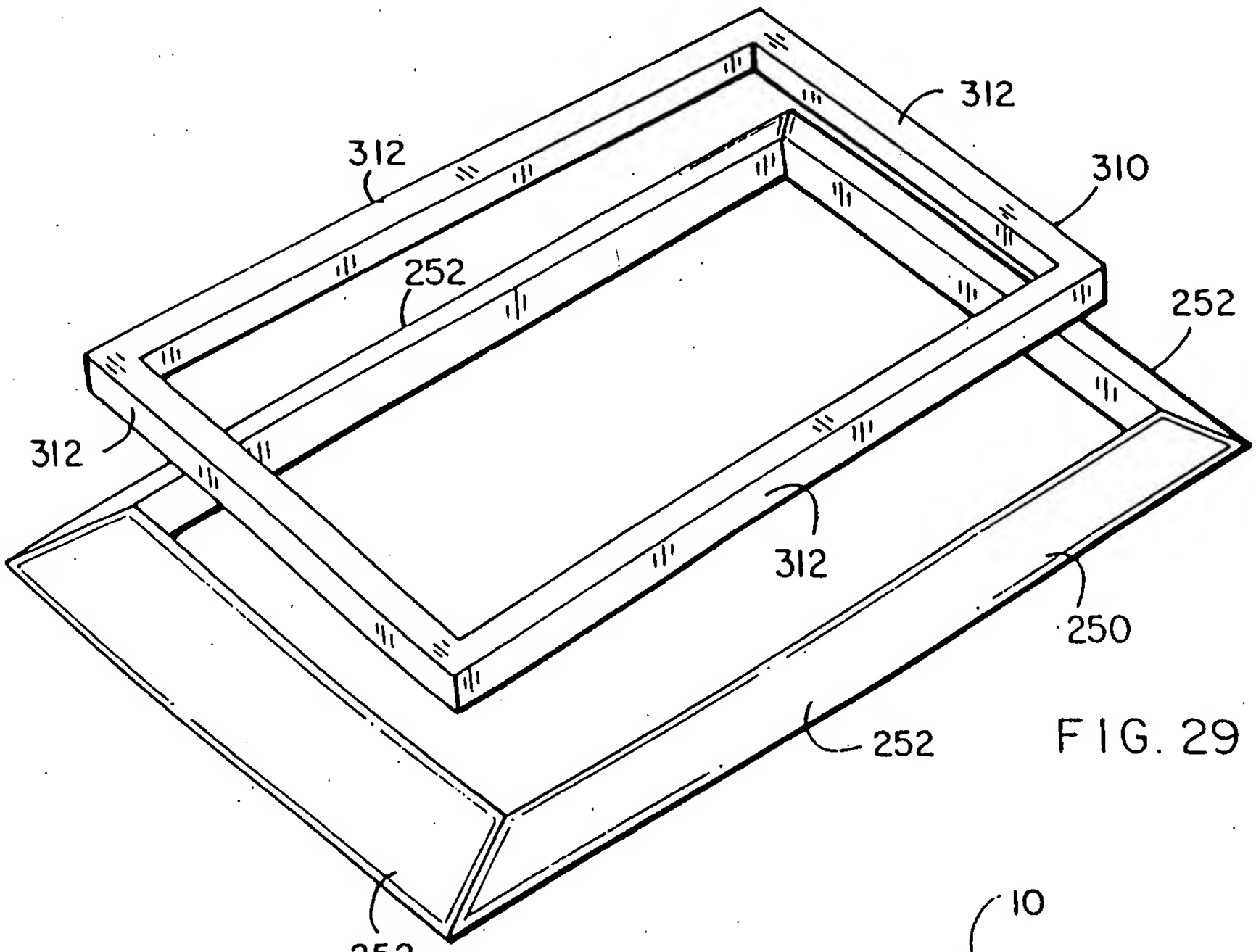
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FIG. 29

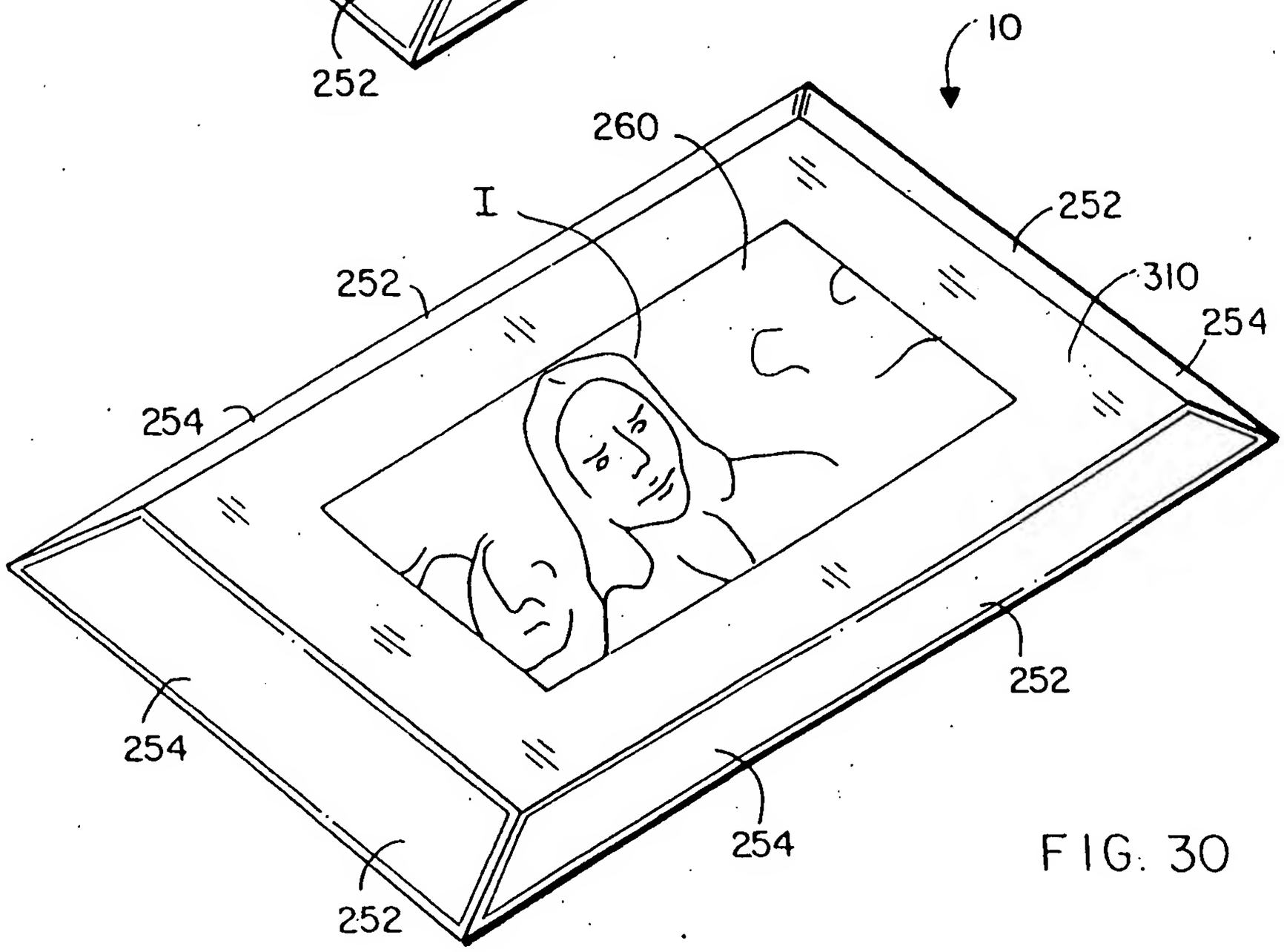
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FIG. 30

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/24133

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) :IPC(7) : A63J 17/00
US CL :Please See Extra Sheet.
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : US CL40/546; 40/714; 362/276; 362/229; 40/564; 40/571; 40/455; 40/354

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

US CL 362/240; 362/125; 362/802; 40/463; 40/768; 40/716

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,265,357 A (YU) 30 November 1993 (30/11/93) (Fig. 1-4) col. 1 and 2 lines 63-68 and line 1-68	1-22 and 23-43
Y		1-22, 23-43
Y	US 4,982,176 A (Schwarz) 01 January 1991 (01/01/91) all	1, 4, 9, 10, 17, 21, 22, 38, 39,
A	US 1,454,799 A (Usher) 08 May 1923 (08/05/23) all	1, 17, 19, 21, 34
A	US 5,546,687 A (Iorfida) 20 August 1996 (20/08/96) all	1-43
A	US 1,416,875 A (Reichl) 23 May 1922 (23/05/22) all	1-43

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
	08 DEC 2000
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No.	Authorized officer BERTRAND ZEADE Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/24133

A. CLASSIFICATION OF SUBJECT MATTER:
US CL :

US CL40/546; 40/714; 362/276; 362/229; 40/564; 40/571; 40/455; 40/354